

OS/2[®]

A G A Z I N E

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DataEase

Dictionary of Computing

HyperAccess

Mailing Assistant

New
os/2[®]
Developer
Section!

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Plus

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LANtastic vs. Warp Connect



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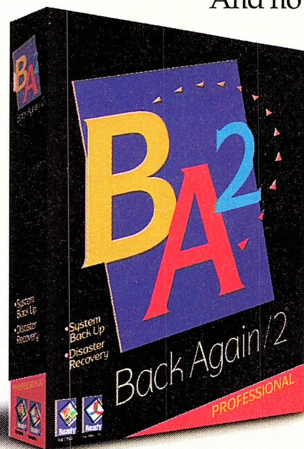
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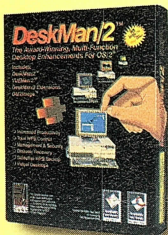
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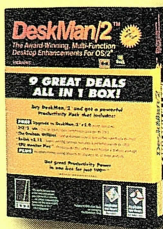
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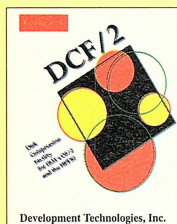
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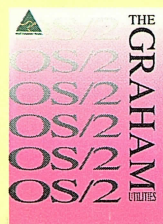
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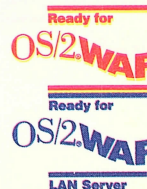


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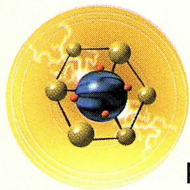
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Share your thoughts, comments, compliments, complaints, corrections, and suggestions about OS/2 Magazine and the OS/2 community. Please note that we can't recommend hardware or software products, diagnose system problems, or provide over-the-phone consulting.

Write or send e-mail to us at the editorial address listed above. Letters will be considered for publication unless clearly marked "Not for Publication." We reserve the right to edit letters for space or style.

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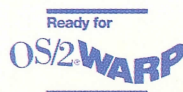
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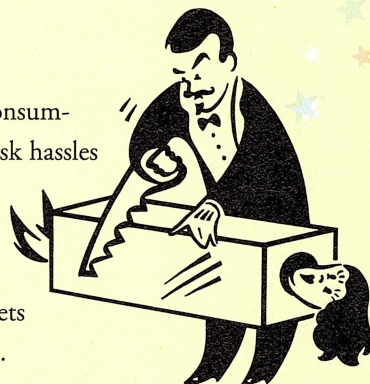


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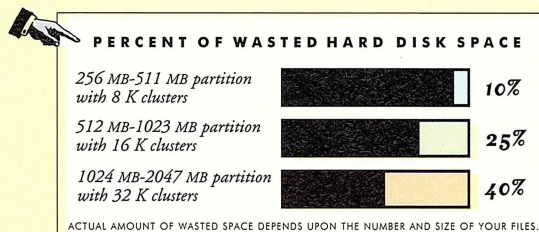
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Perspectives

One Vision

*One man, one goal, one mission
One heart, one soul, just one solution
One flash of light, one god, one vision
One flesh, one bone, one true religion
One voice, one hope, one real decision
One Vision*

A decade after Queen's 1985 hit, the title phrase "One Vision" best describes our process of bringing together two magazines, *OS/2 Developer* and *OS/2 Magazine*, now joining forces to better serve the OS/2 community.

Some history: IBM launched *IBM Personal Systems Developer* in 1989. Three years later, IBM partnered with Miller Freeman Inc. (MFI) to refocus it as the quarterly *IBM OS/2 Developer*. Under the able leadership of Dick Conklin and Cathy Passage (succeeded by Peter Westerman late 1994), *OS/2 Developer* grew and evolved into an independent bi-monthly magazine.

In mid-1993, another MFI publishing team, headed by Ted Bahr and under my editorial direction, responded to OS/2 2.x's success by planning an independent magazine geared to help power users and corporate systems managers. *OS/2 Magazine* debuted in December 1993 and has been published monthly ever since.

Two years passed. OS/2 2.x evolved and matured into OS/2 Warp Connect, and both publishing teams watched and learned.

We learned that although MFI's two magazines appeared to have radically different missions back in 1993, our readers had more in common than anyone initially thought. Naturally, *OS/2 Developer's* readers were power users. But we were surprised to learn that many of *OS/2 Magazine's* loyal subscribers were interested in C++-based applications development. Similarly, REXX coverage has always been highly rated by both magazine's readers.

As the *OS/2 Developer* and *OS/2 Magazine* teams compared notes, one conclusion became evident: By joining forces, we can better serve the interests of the entire OS/2 community. By working together, our combined publication can better help users and their employers realize the greatest benefits from deploying OS/2, and help corporate and shrink-wrap software developers create the best possible applications for their colleagues and customers.

*No wrong, no right
I'm gonna tell you there's no black and no white
No DOS, no Windows
All we need is one world-wide vision
One disc, one Warp, one true religion
One voice, one team, one real decision
One Vision*

Our One Vision requires few changes in *OS/2 Magazine's* traditional lineup. Dick Goran's "The REXX Column," Stan Kelly-Bootle's "End Notes," Mark Minasi's "Under the Hood," Dave Reich's "Tips and Tricks" (moved to the front of the magazine), and Brian Proffitt's "Test Drives" (now toward the back) continue as the foundation of every issue, along with associate editor Alexander Antoniadis' "Dateline: OS/2."

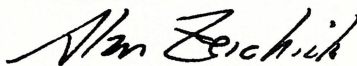
Our editorial base also incorporates the best of *OS/2 Developer*, as editor-at-large Dick Conklin helps guide our applications-development coverage; Dick led the initial 1989 launch of *IBM Personal Systems Developer*, and has been serving the OS/2 community ever since. Fans of Mark Bengel and Matt Smith's "GUI Corner" column will see it twice as often—every month! Guy Scharf's "OS/2 Toolbox" joins us next issue, as does a new monthly column from Roger Sessions, "The World of Objects." And we have some surprises in store for the future.

Of course, *OS/2 Magazine* will continue to include not only columns, but also hands-on tutorial and technical articles, now geared to both end-user and development topics. Naturally, not everyone's interested in C++. That's why we've created a special section, cleverly entitled "OS/2 Developer," to help you distinguish our developer-focused features and columns—which assume a great deal of knowledge about and interest in OS/2's inner workings—from end-user/MIS content.

The "OS/2 Developer" section, in this issue spanning pages 37 to 59, is home to our most technical features and columns. If you're not a software developer, don't be intimidated by all the C++ source code; please look at this section as a doorway back stage, taking you behind the scenes. Everyone's welcome!

*Gimme your mouse, gimme your heart
I'm ready, there's only one direction
No crash, no wait, just excitement
All through the night it's a celebration
One word, one mission
One Vision*

I'd like to ask one favor: Whether you've been part of *OS/2 Magazine's* family, or whether you had previously received *OS/2 Developer*, please share your thoughts about our expanded mission. Drop by our CompuServe forum, send us private e-mail. Help make your vision part of our vision. Only then will it be truly One Vision.



Alan Zeichick
Editor-in-Chief





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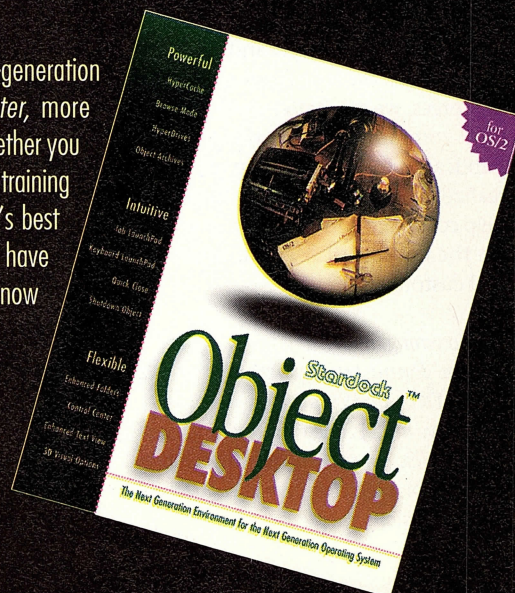
**for
OS/2**

Object Desktop turbo-charges OS/2. It is the next-generation desktop environment that makes your OS/2 system *faster*, more *powerful*, *easier* to use, and well, just plain *nicer* to look at. Whether you are an IS manager looking to increase productivity and reduce training costs, or an end user looking to get the most out of the world's best 32-bit PC operating system, Object Desktop is a must-have. If you have OS/2, you should have Object Desktop. If you don't have OS/2, now there's an exciting new reason to *upgrade* to it.

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Letters

"Newbies aren't newbies for long."

OS/2 Magazine for beginners?

Dear Editor:

As one of the newbies enticed into the world of OS/2 by the release of OS/2 Warp 3.0, I found your September feature, *103 Tricks and Tips* (p. 24), very helpful.

On the whole though, I find the magazine targeted at the traditional corporate OS/2 techie. I know that OS/2 has primarily been a corporate operating system, however, if you want to increase your circulation, you will need to focus some content on new users. A section for newbies, although elementary to your core readers, would give new people the needed help in getting started. If OS/2 is to survive, the pros will have to recognize this need.

Harold Murray

The reasons OS/2 Magazine doesn't have a section for new OS/2 users is simple: Newbies aren't newbies for long, and when they're in that awkward learning-curve stage they need much more information than a magazine can provide—unless most of the magazine is geared for repeating the same tutorial information over and over again.

The best resources for new OS/2 users are books such as OS/2 Warp for Dummies or OS/2 Warp Unleashed. With hundreds of pages at a relatively

low cost, these books do far more to help someone over the learning-curve than OS/2 Magazine can by devoting, say, three to five pages a month to new-user tips.

So, the bottom line: OS/2 Magazine is written for intermediate- to advanced-level OS/2 users—that's what magazines do best. (Most OS/2 users are at this point after they've been using the OS for a couple of weeks.) We'll leave it to the books to take care of that initial curve—that's what they do best.

-Alan Zeichick

Back Again/2 IDE support

Dear Editor:

I read Brian Proffit's article about BackAgain/2 (November p.19) and must address a problem that he ignored. This package won't work on basic IDE drives such as the ubiquitous Colorado Jumbo 250. I tried their demo and couldn't get it to work. I contacted their tech support and sure enough, I received this reply:

"You won't believe it, but we don't support any diskette-attached tape drives...We support all SCSI and ATAPI/IDE tape drives but have never released a version for the low-end tape drive market. There is a reason; due to the hardware, no one can control these floppy-attached tape drives very well."

That wasn't a problem for Mr. Proffit's SCSI drive, but it ought to be mentioned in a follow-up note. I liked the interface and the promise of the product as much as he did. Unfortunately, it just doesn't work with plain vanilla hardware, such as I have. The BackAgain/2 tech support was very nice and their approach does make some sense, but in my opinion, the product isn't for many of us users.

Ray DeGennaro

More preemptive vs. cooperative

Dear Editor:

I'd just like to comment about a letter in the November 1995 issue from a certain Laurence Spector.

It seems Mr. Spector shouldn't be alive right now, considering his claim that he can't truly multitask. I'd like to know his secret for survival without the brain taking on multiple tasks such as respiration, blood circulation, metabolism, and thinking on the side.

I for one, do not enjoy watching downloads or keeping time for a long archive compression/decompression. Nor do I enjoy watching a 1.5GB disk being checked for errors. However, these things do need to be done, so I do them, and once they are started, I proceed to do the next item on the list. OS/2 takes care of the rest for me.

My point is that Mr. Spector is making the wrong analogy. Multiple tasks interacting on the computer correlates directly with a person reading and watching TV at the same time. The processing of tasks in OS/2, without user-interaction beyond dispatching the tasks, correlates directly to the brain taking on the tasks of breathing, digesting, and pumping the heart.

Mr. Spector might think about that the next time he takes a deep breath and notices that his heart doesn't seem to stop.

Mike Ruskai

And on that cheerful note, OS/2 Magazine will bring this long-running discussion about the merits of multitasking to a richly deserved conclusion.

-Alan Zeichick

OS/2 Magazine welcomes letters from readers. Please mail to OS/2 Magazine, 600 Harrison Street, San Francisco, CA 94107, via e-mail at CompuServe 71154,676 or Internet os2mag@mfi.com.

Errata:

The correct parameter in tip #3 (October 1995, p.26) should be **SET RESTARTOBJECTS=X**.

The URL for the OS/2 Games home page was incorrectly listed in Dateline: OS/2 (November 1995, p. 11). The correct URL is <http://www.austin.ibm.com/os2games>.

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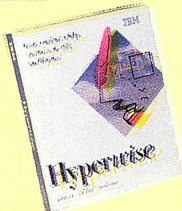


**Tom Cox,
Director of Information
North Carolina Electric
Membership Coop
and OS/2 User**

"I work for 28 electric cooperatives that supply electrical service to over 60,000 homes, businesses, farms and industries across North Carolina. I depend on Indelible Blue's service and knowledge to provide me with the latest and best 32-bit, multi-tasking OS/2 applications available. So, while my spreadsheet is spreadsheeting and my word processor is processing, I can relax knowing my customers aren't being left in the dark."

Hyperwise by IBM

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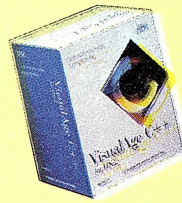


Hyperwise V2.0 for OS/2 Warp is a productivity tool for application developers that enables WYSIWYG authoring of hypertext online information and application help. Using Hyperwise, you can create multimedia-rich online books and help text, or effective tutorials and training materials. Key features of Hyperwise 2.0 include: drag-and-drop techniques; link text, graphics, audio and video; IPF bookmaster and RTF import; INF, HLP and HTML export.

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NovaBack for OS/2 by NovaStor Corporation

Protect your computer or LAN from disasters with NovaBack. With an easy-to-use GUI interface, it supports over 250 SCSI and QIC-80 tape drives. NovaBoot is included for quick recovery from hard disk failure.

NOV80 Bundle MSRP \$149.00 \$75.00



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Reader Service No. 7

The Future of OS/2: Technology & Marketing

BY ALEXANDER ANTONIADES



RISCY business

IBM will port OS/2 to other RISC platforms once the first microkernel version (OS/2 Warp Connect, PowerPC edition) is done. This statement was one of the announcements that John Soyring, Director of Strategic Relations for IBM, made in his keynote at the Colorad-OS/2 Developers' Conference, held last October. Soyring's keynote, combined with other tidbits shown by speakers and participants at this conference, gave some indications on what to expect for OS/2 over the next year.

Besides the PowerPC, versions of OS/2 running on Silicon Graphics' MIPS and Digital Equipment Corp.'s Alpha RISC processors are apparently in the works.

Other news that brought smiles to the faces of SmartSuite for OS/2 users was the formation of a special team at Lotus designed to make sure future releases of the SmartSuite for OS/2 have special OS/2-only enhancements.

IBM is also making moves to better support Win-OS/2 users with plans to extend OS/2's Win32s support, which is needed to run some Windows applications such as AutoCAD Release 13 for Windows. Sure enough, after the conference was finished, a beta Win32s 1.25 code was placed in Section 12 of Compuserve's PSPBETA forum.

However, the long awaited fix for OS/2's single input queue limitation, one of the most talked about items at the conference, was not mentioned in Soyring's keynote. The problem is that OS/2 can only take input from one source at a time; if the input path is blocked, then OS/2 is rendered unusable—even though the operating system is still functioning. The symptom

of this disease is that if you have a crashed program that's blocking access to the system, you press <Ctrl+Esc> (which is supposed to take CPU control away from errant programs), but all you get is the message to kill the program over and over again.

The fix is activated when there is a request to change focus, either by hitting <Ctrl+Esc> or clicking on another window. At that moment the system queries the program to find out if it's accepting input. If the program's not accepting input, the system clears the input queue, paints the window with a special border signifying it's inactive, and stops updating that window's display until the program accepts the input it had from before. It should be noted that a program that's not threaded to process input while busy (such as

OS/2's online help when performing a search) will react the same as a crashed program hogging the input queue. With the fix, such a program will function correctly when the focus is shifted, but will not monopolize the input queue as it does today.

The fix is expected to be available in an upcoming OS/2 Warp FixPak, although specific release details were not available.

There were two more items of encouraging news regarding the development of OS/2's Web Explorer. First, the presence of a native OS/2 version of Sun's Hot Java Web Browser ported by IBM to see how well Java applications run under OS/2. Although the Hot Java browser shown at the conference was for internal use only, IBM is in negotiations with Sun to integrate the Java

OS/2 Top 15 List — October 1995

Rank	Product	Company
1	OS/2 Warp Connect with Win-OS/2 Upgrade	IBM
2	Object Desktop	Stardock Systems
3	OS/2 Warp Connect with Win-OS/2	IBM
4	Partition Magic Professional	PowerQuest
5	BackMaster 2.0	MSR Development
6	Family FunPak for OS/2 Warp	IBM
7	DeskMan/2 Productivity Bundle	Development Technologies
8	DeScribe Voyager CD	DeScribe
9	GammaTech Utilities	SoftTouch Systems
10	DualStor 3.0	IBM
11	IBM Antivirus	IBM
12	Borland C++	Borland
13	Performance Plus 3	Clear & Simple
14	Impos/2	Compart
15	BackAgain/2 Professional	Computer Data Strategies

Best-seller information courtesy of Indelible Blue.

technology with a future version of the Web Explorer. The second announcement came during Lois Dimpfel's keynote. She announced that the customizable extensions demonstrated at Internet World earlier this year (Dateline: OS/2, July 1995, p.11), is available in Web Explorer 1.03 and will be documented so companies can write third-part add-ons.

OS/2 numbers updated

IBM used the one-year anniversary of OS/2 Warp's release to announce the official numbers for copies sold: Four million, with the total number of OS/2 users listed as 10 million.

What's significant here is the number of OS/2 Warp copies sold, because it's a fairly accurate indicator of the active application buyers in the OS/2 market. IBM is due to cut off support for OS/2 2.x early next year, as well as offer a number of technical add-ons to OS/2, such as OpenDoc and the Windows-centric Developers API Extensions (formerly known as DAX) that will probably only

work with OS/2 Warp. If this doesn't convince the remaining six million OS/2 2.x users to upgrade, then not even IBM can claim that there really are 10 million OS/2 users.

OS/2 initiative fizzles while others are born

Blue Orchard Software's six-month roller coaster ride comes to an end. This company that was supposed to bring OS/2 to the masses was sold to Retail Professionals Inc. of Dallas in late October. Blue Orchard's new owners plan to continue the push to get OS/2 applications into retail stores under the WarpWare banner, but this setback is the latest of many for this private company.

Originally started in a complex joint venture between IBM, mail-order reseller Indelible Blue, and a group of venture capitalists, Blue Orchard has had trouble since day one. First, there were the costly terms that OS/2 vendors had to comply with in order to join Blue Orchard, which included submitting large amounts of software on consign-

ment. Next came the exit of co-founder Indelible Blue over a disagreement about the marketing tactics Blue Orchard was using to get into the mass market.

These problems left Blue Orchard alienated from large portions of the OS/2 Vendor community, so a new direction was in order. The changes that Retail Professionals Inc. plans to make includes getting out of the distribution business—where possible—and starting a catalog of OS/2 products that will go out initially to retailers and eventually to consumers.

While Blue Orchard might not be bearing fruit, other initiatives are under way to help. A group of vendors called the 32-bit Alliance, started by Computer Data Strategies, Indelible Blue, and Stardock Systems, is working to raise OS/2 awareness by advertising in national magazines. Another effort, spearheaded by MSR Development's Dudley Westlake, is to replace the ailing OS/2 Vendor Council with another group that can interface directly with IBM executives and voice concerns of independent OS/2 software companies.

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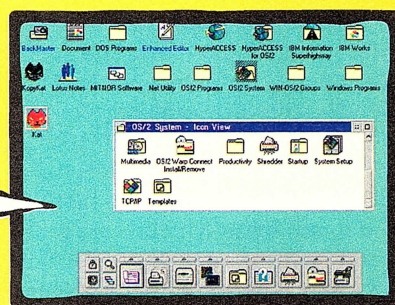


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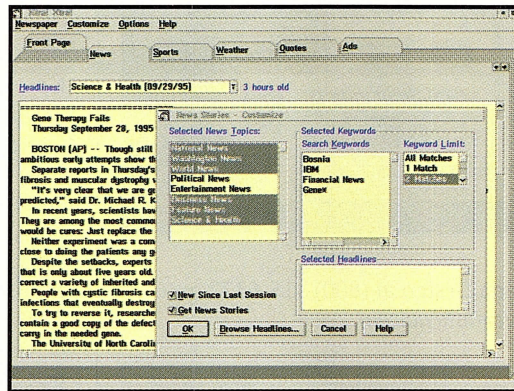
New products for the
OS/2 community

Xtra Xtra for OS/2

Custom newspaper

Sublime Software is offering software that produces a personalized newspaper using the CompuServe Information Service. The user selects topics and enters subjects of interest; Xtra Xtra connects online to locate and retrieve the desired information. A timer is included that will automatically retrieve and print the news daily. Xtra Xtra can be downloaded from CompuServe at Go Sublime, Section 17. Registration is \$39.95. Contact Sublime Software at (617) 783-7104, fax (617) 789-4206, or e-mail 74777.3406@compuserve.com.

READER SERVICE NO. 107



dent, allowing reports to be shared across the enterprise. The software's partitioning capabilities allow reports to be run efficiently by partially or fully offloading them to servers, and minimizing traffic on the network. This technology supports the management of partitioned applications in a distributed environment and enables users to drag and drop objects and functions between available clients and servers. 4S-Report supports native interfaces for SQL databases from Oracle, Sybase, and Informix and provides support for others through middleware products such as EDA/SQL and ODBC. 4S-Report can communicate over most network protocols including X.25, TCP/IP, DECnet, and various PC LANs, such as NetBIOS and Novell. Prices start at \$480. Contact Four Seasons Software at (908) 248-6667 or fax (908) 248-6675.

READER SERVICE NO. 110

ZipStream 1.1

Updated file compression

Carbon Based Software announces an update to its file-compression software ZipStream. New in this release are better caching algorithms and expanded support for check disk. This version can compress read-only files and has graphical versions of the control panel and ZSstatus utilities. It also has a reduced memory footprint. ZipStream 1.1 has a list price of \$99. Upgrades for registered users are free. Contact Carbon Based Software's U.S. agent, ZGC Inc., at (201) 335-4460, CompuServe 73317,1340, or e-mail zgc@mhv.net.

READER SERVICE NO. 108

ers with more functionality in collecting and analyzing metrics in an object-oriented context. ObjectMetrics allows developers to improve the quality of software being developed by gathering metrics, which indicate problem areas such as overly complex code, unnecessary coupling between modules, and the misuse of inheritance. Included in the package is the Metrics Analysis Tool (MAT), a storage and reporting mechanism for metrics gathered. ObjectMetrics is available at \$995 for a five-user pack, which includes one MAT copy. Contact ObjectSpace Inc. at (214) 934-2496, fax (214) 663-9099, or via e-mail at lmccaf@objectspace.com.

READER SERVICE NO. 109

SA-Expert Advisor 3.0

New help desk software

Software Artistry announces the latest version of its flagship product, SA-Expert Advisor. Enhancements in Expert Advisor 3.0 include new technology for better problem resolution, workflow, and interface changes leading to improved performance, new reporting capabilities, and modification for international needs. The new adaptive learning technology enables a user to describe a problem in plain English and access possible solutions from a single database. And, a graphical Report Painter from Crystal Technologies includes more than 100 prepared reports that are ready to use. Expert Advisor uses SQL for all database management and supports many popular RDBMSs, including Oracle, Sybase, Microsoft, Informix, DB2/2,

ObjectMetrics 2.0

Gathering object metrics

ObjectSpace Inc. announces a new version of ObjectMetrics that provides managers and develop-

4S-Report 3.0

GUI report writer

Four Seasons Software releases the latest version of its enterprise report writer, 4S-Report. 4S-Report is platform, database, and GUI indepen-

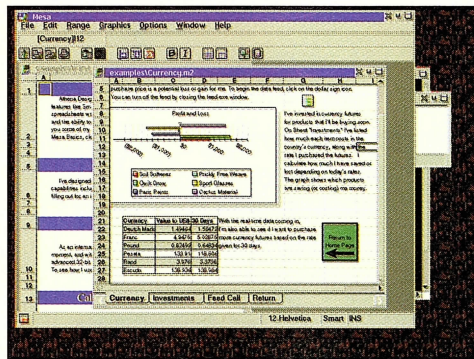
Just Announced

Mesa 2.0.4

New filters and a new look for Mesa

Athena Design announces a new version of its spreadsheet, Mesa for OS/2. New features include filters for Lotus 1-2-3 (.wk4) and Quattro 2.0.4 Pro (.wb1) files, keyboard accelerator keys, automatic column and row resizing, and in-cell editing. The program also includes a script recorder. Mesa 2.0.4 is free for existing Mesa users and \$199 for nonusers. Contact Athena Design at (800) 315-6372 or (617) 426-6372, fax (617) 426-7665, or e-mail info@athena.com.

READER SERVICE NO. 111



Object Engineering Workbench for C++ 2.1

Reverse engineer C++ source code

Terasoft is releasing a new version of its programming tool kit for C++. Object Engineering Workbench 2.1 is a tool for reverse-engineering C++ source code that breaks the code into reusable classes for compilers such as Visual Age C++ or Borland C++. The program sells for \$795, which includes the English and German versions of the tool on OS/2, Windows 3.1, Windows 95, and Windows NT. Contact Terasoft at (508) 634-8400, fax (508) 634-8236, or e-mail 73602.2737@compuserve.com.

READER SERVICE NO. 115

DB2/2 2.0

Updated relational database

IBM is shipping the latest version of its relational database for OS/2. Database2 for OS/2 (DB2/2) adds user-defined types (UDTs) and user-defined functions (UDFs). Common UDTs and UDFs can be shared among major languages including C, C++, COBOL, and FORTRAN. DB2/2 2.0 is priced at \$369 for the single-user license and \$1,499 for a multiple-user license. Contact IBM at (800) 426-4968 or (404) 238-1234, or e-mail askibm@info.ibm.com.

READER SERVICE NO. 116

Powerswitch

Network protection

Apcon Inc. releases a new solution for continuous server uptime for OS/2 LAN servers. Powerswitch provides switching of external storage devices between primary and standby servers, ensuring recovery from system failures. It facilitates

and DB2/6000. Database servers can range from 486 PCs to UNIX systems, and Expert Advisor supports clients running Windows and OS/2. A 10-user license for Expert Advisor 3.0 is \$65,000 (including training and source code). Call Software Artistry at (800) 795-1993 or (317) 843-1663, or fax (317) 843-7477.

READER SERVICE NO. 112

and \$299 for the professional edition (\$129 for upgrade). Contact RimStar Technologies Inc., at (603) 778-2500, fax (603) 778-2408, CompuServe 73150,143, or via the Internet at rimstar@world.std.com.

READER SERVICE NO. 113

StandbyServer 32 for LAN Server 1.0

Fault Tolerance for Networks

Vinca Corp. announces the StandbyServer 32 for LAN Server mirroring system. It provides full server fault tolerance for LAN Server advanced networks. This product gives users the ability to connect a hot on-line replacement server to the main server that can take over instantly if the main server fails. StandbyServer 32 for LAN Server is completely compatible with the features of OS/2, LAN Server Advanced, and IBM NetFinity. The product is available in EISA, MCA, or EISA/MCA and includes two Vinca adapter cards, a 25-foot cable, IBM NetFinity, and all necessary Vinca Software. It will be released April 1995 with a price of \$4,999. Contact Vinca Corp., at (801) 223-3100, fax (801) 223-3107, or e-mail info@email.com.

READER SERVICE NO. 114

RimStar Programmer's Editor 4.0

Programmer's Editor

RimStar Technology announces its latest version of the RimStar Programmer's Editor, now available in a standard edition as well as a C++ Professional edition. Version 4.0's new features include sophisticated project support, file compare, search and replace for files on disk, and enhanced configuration and customization features. The C++ Professional edition offers a C++ class and source code browser. The Rimstar Programmer's Editor is available for OS/2, Windows 3.1, Windows 95, and Windows NT. The list price for the standard edition is \$199 (\$79 for upgrade)

Just Announced

fully automated switching between similar or dissimilar servers to an external disk subsystem. All switching is transparent to the user. Systems can be configured to support multiple servers in a number of dynamic high-availability configurations. Pricing starts at \$2,240. Contact Apcon Inc. at (503) 685-9300 or fax (503) 685-9099.

READER SERVICE NO. 117

TWIN Cross Platform Developers Kit

Cross platform development for Windows API

Willows Software announces a technological and business strategy that allows Windows to be natively deployed on OS/2, Macintosh, and UNIX. The strategy enables corporate and commercial developers to leverage their investment in 16- and 32-bit Windows applications and development efforts. The TWIN Cross Platform Developers Kit (XPDK) provides a library, based on Windows, with added features such as header files and standard development tools, allowing developers to build cross-platform applications in the Windows environment with one development effort. Contact Willows Software Inc. at (408) 777-1820 or fax (408) 777-1827.

READER SERVICE NO. 118

SpaceMap 1.2

File management for disk drives

Capstone Software Inc. announces SpaceMap 1.2 for OS/2, a utility program that summarizes disk space usage by directory. The new version features improved printing facility and error handling,

in addition to safety controls. It also includes a drop-down drive list. SpaceMap has been changed to handle several system error situations, which previously resulted in display of the internal program error window. The price remains at \$59.95. Contact Capstone Software at (800) 500-2244 or (317) 848-2414, or fax (317) 848-2451.

READER SERVICE NO. 119

MKWINOS/2 1.0

Get OS/2 and Win-OS/2

CFS Nevada Inc. is releasing a new utility that synchronizes the Win-OS/2 Program Manager with the subsequent folders on the OS/2 desktop. All of these OS/2 folders will be the same size and have the same relative screen position as in a full-screen Win-

OS/2 session. Existing Win-OS/2 programs will not be modified. The retail price of MKWINOS/2 is \$19.95. Contact CFS Nevada Inc. at (800) 864-2358 or (702) 732-9616, fax (702) 732-3847, CompuServe 71154,2002, or dgoran@cfsrexx.com.

READER SERVICE NO. 120

Virtual Pascal for OS/2

New Pascal compiler

fPrint UK Ltd. announces a new Pascal compiler for OS/2. Virtual Pascal for OS/2 is a 32-bit compiler designed to be compatible with Borland Pascal 7.0. This first release of Virtual Pascal includes an Integrated Development Environment, Borland Turbo Vision- and OWL-compatible libraries, and access to most of the OS/2 API. Also included is a Turbo Debugger-style integrated symbolic debugger. Add-on options include Object Pascal extension compatibility and Borland Delphi compatibility. Contact fPrint UK Ltd. at +44 (0181) 563-2359, CompuServe 100327,2035, or e-mail mertner@ibm.net.

READER SERVICE NO. 121

Just Announced OS/2 Internet Sites

<http://www.austin.ibm.com/pspinfo/os2ww.html>
The IBM Worldwide Electronic Resource Guide online. The focus is OS/2 and related products.

<http://www.austin.ibm.com/pspinfo/drk.html>
The "Just Add OS/2 Warp" homepage.

<http://www.aescon.com/bestofos2>
The Best of OS/2.

<http://apacweb.ag.utk.edu/os2>
Home to the Knoxville OS/2 Warp User Group with information on meetings and links to other sites.

http://www.teamos2.org/software/must_have/
Gary Hammer's 'Must Have' listing of OS/2 utilities.

<http://www.os2forum.or.at/TeamOS2/>
Team OS/2 Austria homepage.

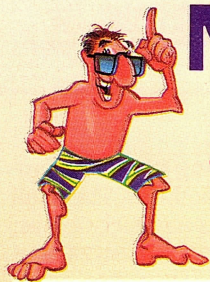
<http://pscc.dfw.ibm.com/info/techconn.html>
The Technical Connection CD-ROM program that provides information at your fingertips.

Team Connection

Groupware for developers

IBM is releasing TeamConnection, a tool for application development teams. Combining object repository and software configuration management services, TeamConnection provides a LAN-based client/server development environment that allows teams to collaborate during each step of the development cycle. Features include version control, problem tracking, and change control. The program also includes reporting, backup, and recovery facilities. \$1,999 per user. Contact IBM at (800) 426-3333 or (404) 238-1234.

READER SERVICE NO. 122



New Year's Resolution #1:

the **Programmer's Paradise**® the developer's best source for software.
OS/2 Action Catalog

Visual SlickEdit for OS/2—

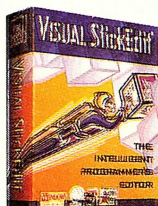
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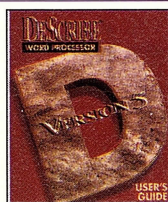
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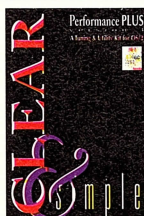
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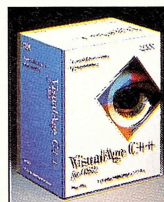
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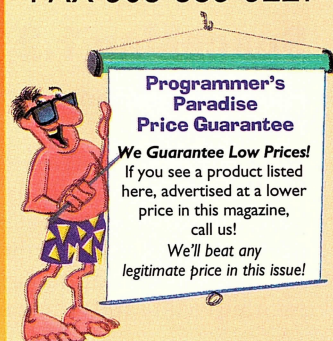
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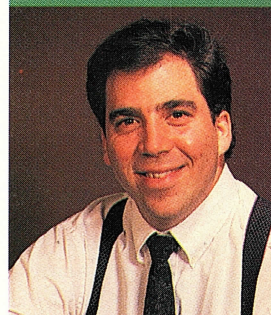
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Risks, Drivers, and Mystery Bars

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TIP 198:

CALCULATED RISKS

Q: I like the calculator applet in OS/2 2.x, but it's not in OS/2 Warp 3.0. How can I get it to work in OS/2 Warp 3.0?

A: I received the following tip from Kevin McCarthy, of Kensington, Conn. This tip shows how to keep the calculator mini-application in the OS/2 2.x system for use in OS/2 Warp 3.0.

I must caution any user who wishes to make this change that you must keep the Proof of License for your copy of OS/2 2.x. If you have sold your copy of OS/2 2.x, you no longer have a license to use the files I am discussing. If you have kept your license around, just make sure you hang onto it.

To use the calculator applet, first go through your OS/2 2.x system and find the following files:

```
\OS2\APPS\PMDCALC.EXE
\OS2\APPS\DLL\PMDIARY.DLL
\OS2\APPS\DLL\PMDIARYF.DLL
\OS2\HELP\PMDIARY.HLP
```

Copy them to the same-named directories on your OS/2 Warp 3.0 system's boot drive.

Now, create a program object that points to `\os2\apps\pmdcalc.exe`. To perform this function, bring up the context menu for any other program reference object, right-click on it, and select Create Another. You can also go to the Templates folder. Using the right button, drag and drop any Program object into another folder or onto the desktop. Once you have the dialog for the program infor-

mation, enter the path and file name for `\os2\apps\pmdcalc.exe`. Then, enter the same path for the Working Directory field. After you name the object in the appropriate place, close the dialog and enable the object by double left-clicking on the System icon in the upper left of the dialog. Now open the object, and you will have the calculator applet.

TIP 199:

PASSING PARMS

Q: I have not figured out how to pass settings parameters to programs I plan to run in DOS VDM.

A: Referring back to the discussion on passing DOS settings via a `rexx.cmd` file ("Pass the DOS Settings, Please," May 1995, p.67), you can pass a variety of settings and setup strings to Workplace Shell objects. To pass parameters to the program you are starting, use the keyword **parameters** the same as you would for other attributes (Listing 1).

The difference between this program and the one in the May 1995 issue is the addition of the parameters variable, and the **or** operations on that variable in the SysCreateObject statement. This works for any of SysCreateObject's setup strings.

TIP 200:

HIDDEN INETD

Q: When using TCP/IP, I want the icon that appears when `tcpstart.cmd` starts to be invisible on the desktop. I

tried the detach command, but the software cannot run detached. I want to telnet to computer systems in the public lab I manage, but I don't want the users to stop the INETD process that allows me to telnet to that system. Is there a way to make this icon invisible on the desktop?

A: It is not really `tcpstart.cmd` that you want hidden but the INETD process and the icon for the process. This process is started from `tcpstart.cmd`.

First, in `tcpstart.cmd`, make sure that INETD is started by the line:

```
START /MIN INETD
```

This line will start it minimized. You must also ensure that the setting for minimized programs is either hidden or placed in the Minimized Window Viewer. These two options will keep the icon off the desktop. To accomplish this, open the OS/2 System folder. Next, open the System Setup folder, and then open the System object. Select the Window page and choose the Minimize Button Behavior to either have the window hidden or minimized to the Minimized Window Viewer. The former will cause the minimized INETD (the icon) to be hidden, and the latter will place it in the Minimized Window Viewer. Either way, it will not be visible on the Desktop.

Unfortunately, this solution is not completely foolproof—by pressing <Ctrl+Esc> you can see INETD in the Window List. So, you can't completely hide the INETD process from users, unless you also write a small program that you call from `tcpstart` that removes the INETD entry from the Window List. Minimizing the icon, with the Mini-

LISTING 1: Launching a DOS program from another with specific settings.

```

/* STARTVDM.CMD: Sample code using REXXUTIL's SysCreateObject function */
/* Starts a DOS program using specific DOS VDM settings. */
/* The example invokes the PKZIP.EXE program using files setting of 45 */

/* Load the REXXUTIL functions first */

call rxfuncadd sysloadfuncs, rexxutil, sysloadfuncs
call sysloadfuncs

/* Now we will set up the parameters to be used in creating the program */
/* reference object. Then we will make the basic call of: */
/* result = SysCreateObject(classname, title, location, setup) */

classname='WPPProgram' /* This is a program ref object */

title='My DOS Program' /* Whatever title you like */

location='<WP_NOWHERE>' /* place in invisible folder */
/* This will cause the object to */
/* disappear afterwards since */
/* WP_NOWHERE is for transient */
/* Objects */

program='EXENAME=C:\PKUNZIP.EXE;' /* DOS program name */

type='PROGTYPE=WINDOWEDVDM;' /* type of DOS session (windowed) */

startup='STARTUPDIR=C:\;' /* startup directory */

settings='SET DOS_FILES=45;' /* required DOS settings */
/* You can do many settings at */
/* Once, separated by commas */

open='OPEN=DEFAULT;' /* open now. */

parameters='PARAMETERS=C:\ZIPFILE.ZIP;' /* Parameter to PKUNZIP.EXE */

/* Now we will call the REXXUTIL function to open the object. */

call SysCreateObject classname, title, location,,
program||type||startup||settings||open||parameters, 'REPLACE'

Return

```

mized Windows Hidden, is about as close as you can get—without writing a program.

TIP 201: SHADOW TEXT

Q: I want to change the color of the shadow object text, but I can't seem to figure out how! I'm sure it's an easy drag and drop, and I recall seeing this topic addressed in *OS/2 Magazine*, but I can't find it again. Can you help?

A: It was addressed in the September 1994 issue, and given the time since then, I'll restate the procedure.

While dragging and dropping colors from the color palette works on most of the objects in the Workplace Shell, an object's shadow text will not accept a color drop. The only way to change it is through the color palette. To affect these color changes, open the OS/2 System folder and double-click to open the System Setup folder. Next, open the Scheme Palette. Within the Scheme Palette, select a new scheme, or one you want to edit, and select the entry in the Window area field for Shadow Text. Edit

the color and close the scheme. To activate the scheme for one folder, drag the scheme using the right mouse button, and drop it in that folder. To make the change for all folders in the system, drag the scheme while holding down the <Alt> key, and drop it on the desktop.

TIP 202: MORE ARCHIVING

Q: Thanks for the information on the archiving function of OS/2 Warp 3.0. I am interested in the archiving

function's ability to be customized, and specifically, the number of archives one can create. Ideally, I would like to set up a circle of 20 archives that cycle in a FIFO manner. That is, the 21st archive would replace the first, and so on. I am concerned, however, about multiple archives creating the problem of endless archive bloat. Can you elaborate on the method for setting up the number of archives?

A: The archiving function, as it currently exists in OS/2 Warp 3.0, does not allow you to specify the number of archives you will keep. The present implementation only allows up to three archives. If you have the archive function set to automatic for every reboot, or if you choose to archive periodically, the fourth will overwrite the first, the fifth overwrites the second, and so on.

For more information on the archive function, open the **Master Help Index** and select the **Search** function. Search for archive, specifying all sections, and you will see everything you need to know about archiving desktops.

TIP 203:

MOVING DRAWERS

Q: I recently saw someone demonstrate OS/2 Warp 3.0 at our user's group in Holland. I noticed that the drawers in the Launch Pad were not on the Launch Pad itself but on other places of the screen. Can you tell me a little about this feature?

A: A little known feature of the OS/2 Warp Launch Pad is the ability to tear off drawers and put them elsewhere on the desktop. This allows you to keep drawers open and visible on the screen, without them cluttering up the area immediately above or adjacent to the Launch Pad itself.

To accomplish this feat, open a drawer on the Launch Pad by clicking on the small bar with the arrow above an icon (or next to it, if your Launch Pad is set up vertically). Now, left-click (or right-click—either will work) on an empty space on the drawer, and, holding the button down, drag the drawer to the desired location. While open, the drawer will remain in that location.

You can keep the drawer in that spot while it is open (you can even move it to other locations while it remains open). Once you close the drawer and reopen it, it returns to its original spot on the Launch Pad. This applies even if you close the drawer with the Launch Pad arrow with which you opened it, or if you have the Launch Pad set to close the drawer after objects are opened. In any event, once the drawer is closed, a subsequent reopen of the drawer will return it to its original spot. This is not a bug but a conscious decision on the part of the developers.

TIP 204:

MYSTERY BARS

Q: Whenever I boot my OS/2 system, I get scroll bars on the desktop. These bars are independent of the icon placement; if I move all icons to the

center of the screen, making the bars vanish, and then reboot, the bars reappear. Stranger still, if I move an icon towards the edge of the screen, the bars disappear. How can I get rid of these scroll bars?

A: In some cases, the desktop can get confused as to where objects are located on the screen. If it thinks that objects are located off the screen, or too close to what it thinks is the edge of the visible desktop area, the Desktop folder (and it is a folder) will show vertical or horizontal scroll bars to indicate the situation.

The only thing you can do, short of rebuilding your desktop and .ini files, is to bring up the Desktop Context Menu by right-clicking on an empty space on the desktop, and selecting **Arrange**. This will tell the Desktop folder to take all of the objects on the desktop and arrange them so that they are all in order, and so that none are close enough to the edge to cause scroll bars to show.

Once you do the **Arrange**, immediately shut down your system to save the configuration. When you reboot, your problem should be solved.

TIP 205:

PAUSING REXX

Q: I use the BonusPak Internet Connection with my local service provider. I wrote a script to log on to my provider, but I can't seem to find any REXX command to pause the script. I wrote the script using the System Editor *e.exe*.

When I use my Internet access via Win-OS/2 I can use the command wait 30 or something similar. Is there a command in OS/2 that will pause the script, or am I just pounding sand?

A: While some batch languages have commands to wait for a specified time, the REXX language provided with OS/2 does not have an intrinsic sleep function. You can, however, load the REXX utilities (also included with OS/2) into the system and call SysSleep.

Use the program shown in Listing 2

LISTING 2: REXX program to cause a 30-second delay.

```
/* REXX code to wait for 30 seconds */
/* First load the REXX Utilities */
call rxfuncadd sysloadfuncs, rexxutil, sysloadfuncs
call sysloadfuncs

/* Now use the SysSleep function with the number
/*of seconds to sleep */
call SysSleep 30
```


Tips & Tricks

to load the REXX utility functions and then pause for 30 seconds. You can then add these lines to your Internet dial-other providers REXX script.

TIP 206:

DELETING UNDELETE

Q: When using OS/2's undelete capabilities, I have noticed that temporary files and print spool files get put in the delete directory or undelete list for possible retrieval. There have been several occasions when these temporary files have prevented me from recovering a file through the undelete facility. Is there a way to keep temporary files from being placed in the undelete list?

A: Some things you can prevent, and some you can't. At some point in the past, you might have taken an overt action to enable the undelete facility. The line:

```
REM SET DELDIR=C:\DELETE,512;
```

in your *config.sys* file, as put there by the OS/2 installation programs has the DELDIR environment variable disabled (as evidenced by the REM before it). To enable undelete, take out the REM and on reboot, undelete will be enabled. Because DELDIR is an environment variable, it is queryable by applications when they search the environment strings.

You could disable undelete entirely by putting the REM back and rebooting. While undelete is enabled, you cannot stop applications from putting temporary files into that directory. More likely, however, is that your application is deleting temporary files that may conflict with others; with undelete enabled, the old file is placed into the DELDIR directory.

What you really have is a double-edged sword. You want undelete, but you don't want some files to be part of it. Undelete is either on or off. You have to decide which is of more use to you; turning it off or having the possibility of running into some temporary files

that prevent you from getting one back every now and then.

TIP 207:

NEW LOGOS

Q: I'm getting tired of seeing the OS/2 Warp logo when I boot up. Is there any way I can change the logo to be one of my favorite bitmaps?

A: The file format used by the OS/2 Warp 3.0 boot logo code is not quite the same as a bitmap file. However, some programs out there, in shareware- and BBS-land, allow you to create OS/2 boot logos. A good place to look is on Hobbes on the Internet or your local BBS.

Once you have the appropriate program and create your logo file, just replace the system logo file. This file is in the root directory of your boot drive. The reason you cannot see it is because the system, read-only, and hidden attributes are on the file.

To begin, remove the attributes by typing:

```
attrib -h -s -a -r os2logo
```

Now, rename this file to *os2warp.lgo* as follows:

```
ren os2logo os2warp.lgo
```

Finally, copy your logo file to the root of the boot drive, rename it to *os2logo*, and put the attributes on the file:

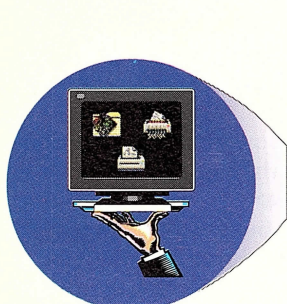
```
attrib +h +s +a +r os2logo
```

Rebooting your system should provide you with the desired results.

David Reich has been with the OS/2 development team since 1987. David is a contributing editor and has written numerous articles on OS/2. He is the author of Designing High Performance OS/2 Warp Applications published by John Wiley and Sons. Questions can be addressed to David via CompuServe at 76711,632 or over the Internet at speedracer@bocaraton.ibm.com.

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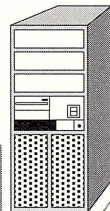
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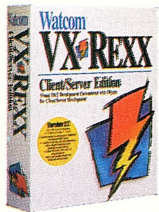
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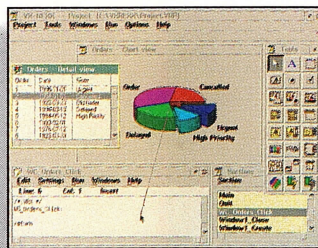
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What is it?

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The fact that REXX is unique among languages is its major strength as well as its principal shortcoming—although we are not speaking of a technical shortcoming. On the contrary, the problem is that the considerable power in REXX goes largely unused. Because most OS/2 fans and even most developers have no basis for comparison, they are not yet aware of what they could be accomplishing with REXX. What makes REXX so special? Simply put, REXX can be made to control other programs. We will learn why this is so important later. The reason this represents a shortcoming at present is a classic bootstrap problem.

In order for OS/2 users to recognize the power of REXX, developers must first program into their word processors, spreadsheets, and other applications a suitable REXX application program interface (API). Marketing and cost control factors, however, dictate to developers that unless they perceive a demand for some feature, they won't put it into the current version of the software. Because few users know what to ask for with respect to REXX, few developers are supplying it. Some even perceive REXX as a sort of unnecessary or at least inconvenient appendage to their work. After all, they programmed a really great application. Why should anyone need REXX too?

While it's not difficult to insert a REXX API into an application (see *OS/2 Developer's REXX Report*, Summer 1994), the real challenge involves inertia, perceived need, and communication. REXX potentially represents the strongest card OS/2 has to play in the Operating System Game, but developers must start cooperating in certain ways before REXX can reach that level—and users must ask developers for REXX APIs in their products.



BY MERRILL CALLAWAY

Pick and choose

Multitasking brings the necessity to stop thinking in terms of one program at a time, or even one program to do everything in a particular project. We are not quite there yet, but the way OS/2 and REXX may soon work together goes something like this:

To produce, say, an illustrated catalog, enter text into EditMan (developed by ABC Corp.). At appropriate times, select the text you wish to spell check and launch a REXX macro that starts up SpellCheck (by XYZ Inc.), which lets you correct/replace/skip words as usual, returning updated text to EditMan. You start up LayOut (by DTP Inc.) and insert text via the clipboard or REXX macro.

Other macros let you edit illustrations, make the index, change the fonts, and so on. As you edit and insert new text in LayOut, check the spelling with the same SpellCheck as before, using essentially the same macro as in EditMan. The developers of these products will have provided standardized REXX APIs and macros, but you can also write your own whenever you need something special.

Different products by different manufacturers cooperate together by controlling each other via REXX. These modular applications are bricks with REXX mortar binding them together into a large custom application. Presently, OS/2 and REXX are more analogous to a natural stone wall: you must "custom fit" every attempt to control another process.

The cooperative processes mentioned might be called composite applications. Thanks to what REXX can do, we may soon see smaller, modular applications in the form of engines that specialize in one thing and communicate data with and control other applications in a standard way via REXX. Because REXX has the potential to control (or script) another program, it is possible to exercise this control (through the REXX API) without ever resorting to the use of that application's GUI.

Many OS/2 users know that when a program controls itself through its own REXX API, it can "run REXX macros." But what most people do not know is that macros are a special case of the larger concept of interprocess control (IPC), which is simply a macro working in and across several applications. Because

Listing 1: Simple REXX server.

```
/* MYSVR.CMD */
/*
** This program assumes you own REXXLIB by Quercus Systems
** and have loaded its files and registered its functions
** with your system. See page 18 of REXXLIB docs.
**
** A macro similar to this can be the startup
** macro for your application. Instead of adding up number
** list, however, the piped REXX commands are executed
** through the application's REXX API.
*/

name='\PIPE\mypipe'

/*
** NOTE: Pipe name must start with '\PIPE'
** If server is on a different computer, then pipe name must
** be in the form '\\servername\PIPE' where servername is the
** actual name of the computer on which the server is
** running.
**
** First, create a named message ('M') pipe for I/O
** rc>0 indicates success. A negative number is an error.
*/

rc=NMPIPE_CREATE(name,'M','M')
say 'Creation of pipe named 'name 'returns:' rc

do forever /* A loop to serve clients. */
```

cont'd on p. 25

OS/2 protects its processes, it does not routinely allow access to them by a REXX macro (or any other program) launched from outside these processes. However, with a nominal amount of developer support, REXX macros *could* easily control other applications.

Before pursuing that topic further, let's look at two important points: factoring and wrappering, and the fact that macro capability isn't enough.

Factoring and wrappering

Contrary to expectations, the graphical user interface isn't the end-all and be-all of any application. Sure, for the last 10 years GUIs have been the hot thing, and mainframe-style command line or dialog-based applications have fallen out of favor. Even though it may be appealing to the eye, any GUI is secondary to the processing work that goes on behind it.

Many cutting-edge applications are

now separating out GUIs, concentrating again on modular engines with built-in APIs that give various languages access to their inner workings via command strings. At first glance, controlling an application with commands may seem a bit retro, but results in being more powerful than having only an integral GUI. Why? Because you may need to automate repetitive or complex actions, maybe across a network. Who wants to sit there clicking buttons? Programmable control via command strings is the most efficient way to execute a large number of commands, especially in a distributed environment. Ironically, it is also far easier to produce a custom GUI for such a product. For instance, IBM's DB2/2 is built around a robust and speedy database engine with C, FORTRAN, and REXX APIs to control it. The user may elect to access the engine from the OS/2 command line, from DB2/2's default GUI, or from a custom-made interface,

Listing 1: *cont'd from p. 24.*

```
/* Next, connect to pipe and wait for a message.      */
rc=NMPIPE_CONNECT(name)

message=NMPIPE_READ(name)
say 'Client message is:' message
/* Client closes down server if it sends a 'Q'      */
if abbrev(message,'Q') then signal quit

/* Process the request                                */
reply=0
do i=1 while message\=''
  parse var message num.i message
  if datatype(num.i,'Number') then reply=num.i + reply
  else do
    reply='Error. Cannot add non valid numbers.'
    leave i
  end
end i
/* Send the data back as a reply                      */
rc=NMPIPE_WRITE(name,reply)
/* Disconnect to wait for another client.            */
rc=NMPIPE_DISCONNECT(name)
end /* do forever loop

quit:
/* Clean up after we are finished.                   */
rc=NMPIPE_CLOSE(name)
say 'Named pipe 'name 'closed. RC='rc
exit
```

embedding SQL commands in whatever language is appropriate.

Because the DB2/2 engine is compiled from an efficient, low-level language, the execution time never becomes a handicap, even if you use REXX (which is interpreted) to control DB2/2. The DB2/2 inner-core functions are completely separate from any sort of GUI code. Therefore, constructing a commercial, custom GUI for DB2/2 using Watcom's VX-REXX or HockWare's VisPro/REXX (or any other GUI builder) is feasible and cost-effective, since all DB2/2 core functions are accessible from any GUI/event code you create in REXX, C, or FORTRAN.

Ideally, every developer separates out all core functions so they can be called by any GUI code or REXX script operating through their application's REXX API. For applications with an integral GUI, if the developer adds a REXX API, then the application is "fully factored" if every event in the

GUI has a corresponding REXX command. This is seldom the case, unfortunately. DB2/2, however, is fully factored for REXX.

A more usual implementation of a REXX-aware application uses wrappering, which is when application developers make their programs' set of C (or other language) functions available to REXX by wrapping each C function call in a code "wrapper" to translate from REXX to C and back again. A good example of wrappering is the enhanced editor, EPM, which is written in the E language. EPM has wrappered its E commands so that they also function as REXX commands.

EPM is far from REXX-controllable without its GUI, however. A common oversight in creating a REXX command set is to neglect getting information from the application. Most REXX command sets will have commands to set preferences but, too frequently, finding out what settings are in effect is omit-

ted. A complete REXX command set will let you get what was set. Remember, the ideal REXX API does not need the GUI at all!

REXX Macro APIs

Another important point is that REXX macro capability is not enough. To have true composite applications, two things must happen. Standardization in the way REXX APIs work is necessary—enough so that developers can agree on how to control one application from another using REXX. We don't want applications from a powerful vendor talking through proprietary interfaces. Thus, standardizing REXX command sets and IPC methods should be a high priority at all developer conferences.

IBM, meanwhile, is developing Object REXX to use the standards of the System Object Model (SOM). As welcome as Object REXX is, we may be skipping some obvious and necessary steps to enhance, standardize, and simplify REXX in general. Furthermore, few users will care to compile SOM objects for their composite applications. Using SOM requires a much deeper knowledge of OS/2 than many users are willing to get. The obstacle to REXX IPC (if you are not using Object REXX/SOM) is that your multitasking applications are each protected against any outside influence, including control by a REXX program launched from another application. The second thing composite applications must overcome is this obstacle.

Process communication

There are several ways around too much protection, but we must agree on *some* standards to get true composite applications. For REXX to communicate across applications, we may choose either named queues or named pipes since these are globally accessible by name from any process. Unfortunately, the REXXUTIL functions supplied with OS/2 primarily deal with desktop objects. Only one pipe function exists: to wait for a pipe. The REXX queue functions allow only a limited amount of messaging between applications because they lack functions to manipulate OS/2 semaphores (REXXUTIL may soon add these functions).

Semaphores are used in a multitasking environment to signal when events

Listing 2: Simple REXX client.

```

/* MYCLIENT.CMD                                     */
/*
** Run this in a separate window
** It assumes you have registered REXXLIB
** functions with your system.
**
** name must start with '\PIPE'
*/
name='\PIPE\mypipe'
do forever /* loop to get repetitious input          */
  say ''
  say 'Enter a list of numbers separated by spaces.'
  say 'Server will return their sum.'
  say 'Enter Q to quit and close down server named pipe.'
  pull message
  /*
  ** NMPIPE_CALL() opens pipe, sends message, gets reply
  ** from server, all in one line. Standard REXX I/O may
  ** also be used, e.g. rc=lineout(name,message), but
  ** you must also use datafromsvr=linein(name) to get the
  ** message the server sends back. Pipes may be treated as
  ** any other stream by REXX.
  */
  datafromsvr=NMPIPE_CALL(name,message)
  if abbrev(message,'Q') then leave /* quit          */
  say 'Server returns:' datafromsvr
end
exit

```

happen or whether a resource is owned or free. In multitasking, an orderly exchange of data and messages is necessary or fatal traffic jams will occur. Now the good news. There are several third-party packages of REXX functions (in the form of DLLs) that supply what we need for IPC with REXX. One such DLL is REXXLIB by Quercus Systems. It includes a set of REXX functions that deal with event semaphores as well as ownership semaphores. Semaphores may be used effectively with queues to share resources. REXXLIB also supplies functions to create and manipulate named pipes, which are on a much higher level.

Listings 1 and 2 show a simple REXX server and REXX client, which demonstrate the way these REXXLIB functions work. Open two OS/2 windows. Run *mysvr.cmd* in one, and it will show that it has opened a pipe and is now waiting for input from the client. Run *myclient.cmd* in the other window. It will ask for a string of numbers separated by spaces. When you enter num-

bers in the client, they are sent to the server where it performs the processing, adding up the numbers in the string. The server then returns the result to the client which displays it.

If the client sends a 'Q' to the server, it closes down and the client exits. This simple exercise illustrates the way we may get one process to control another under the client/server model. This server could be transformed into a start-up macro for a REXX-aware application. Instead of adding up number strings, it would execute command strings it found in the pipe that use the application's REXX API, writing the results back to the pipe.

REXX plumbing

All OS/2 applications should include such a named pipe for receiving REXX commands from outside their process. In other words, there ought to be a REXX server (somewhat like our example) built into every OS/2 application. It finds commands in the pipe and executes them through the REXX API,

returning results to the pipe as well as disconnecting and reconnecting to wait for the next client. When the application shuts down, it closes the pipe.

A consensus of developers can create a standard and uniform way to do this in every OS/2 application. The application's REXX server would be programmed in low-level C, of course. As for the clients, any REXX DLLs (such as REXXLIB) that let REXX deal with named pipes could be used. There can be a convention for naming these pipes so that no one has to guess, such as the name of the application prefixed by 'P4', as in '\PIPE\P4AmiPro' (Pipe for AmiPro). Implementing a named pipe into each application would not in any way detract from OREXX or SOM, but it would give people an intuitive and simple but powerful way to create custom composite applications.

Remarkably, IBM is touting the messaging capabilities of its forthcoming Object REXX and its object orientation, but their developers—and almost everyone else in the OS/2 community—have largely ignored classic REXX's communication possibilities.

A call for standards

At present, no guidelines exist regarding REXX API command sets, either in look/feel or in what constitutes a sufficient set of commands. There is also no agreed upon way to launch a REXX macro from an application.

In object-oriented programming, the concept of "polymorphism" (code that is reusable under different circumstances) is very important. As long as REXX command sets maintain their proprietary flavor, no reuse of macro scripts between applications will occur. But suppose for a minute that REXX command strings, which duplicate events in the GUI, had as much standardization as the GUI's appearance does? In other words, suppose opening a file were always the string **OPENFILE**, and not **OPEN** in one application and **GETFILE** in another. Now suppose that IBM, together with OS/2 developers, wrote a standard for every event that applications might have in common, such as **SAVE** or **SAVEAS** (and not just the command string but the format/kind of the data it returns, error codes, and other particulars). Were that to happen, we could reuse 95% of our

REXX macro and IPC code in other applications.

If there were a consensus on how to launch REXX macros from PM applications (such as a programmable menu with hot-key activation of REXX scripts), it would help both users and developers. Users would only need to learn one way to do it, and developers would not need to document standard ways of using REXX, any more than they need to document the way to use the OS/2 clipboard. Standardizing REXX as it applies to macros and IPC is a neglected area that should be addressed now, especially in light of the upcoming Object REXX standards. REXX command set guidelines need not be completely rigid, but the idea is to do what can be done to simplify and standardize—exactly parallel to what was done with the standard appearance of OS/2 GUIs.

Where will a fully integrated REXX take OS/2? As long as we talk about spreadsheets and word processing, there may not be enough need or incentive for people to want to perform REXX-based IPC or for developers to program it into their products. Client/server environments clearly benefit because everything runs faster when only command strings are exchanged. In multimedia, IPC will quickly become a necessity. Multimedia implies that everything goes, so it is unlikely that any one tool will meet every need, either in development or performance.

In summary, users should ask developers to put REXX APIs that will do everything in REXX scripts that can be done via the GUI. Developers should take another look at how they implement REXX-aware products, paying particular attention to making the program function via REXX without using the GUI at all.

Developers also need to implement a REXX server with a pipe that works similar to our demonstration. This "back door," which receives REXX commands and sends back replies without going through the GUI, will be indispensable in distributed computing and should be included, notwithstanding the advent of Object REXX and SOM. If for no other reason, it should be included because it is simpler to use, and therefore more use will be made of it. IBM can create feasible

standards for REXX API look/feel, command names, and how to launch REXX scripts. Finally, all developers can make REXX their universal macro language and take steps to eliminate redundant commands left over from previous macro languages. If the idea of standardized REXX Interprocess Control in OS/2 takes root, OS/2 will have no rivals.

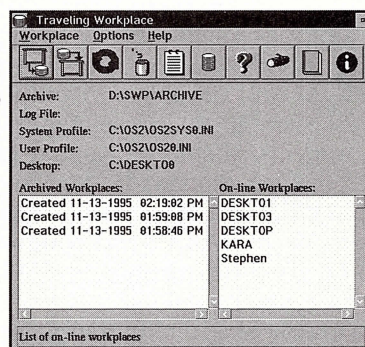
Merrill Callaway, a former aerospace senior logistics engineer, is the author and

also publisher of two REXX books, The AREXX Cookbook (Amiga REXX) and The REXX Cookbook (OS/2 REXX), as well as a contributing editor and REXX columnist for Amazing Computing magazine. His "REXX and PostScript" article can be found in the OS/2 Developer's REXX Report, Summer 1995. Callaway also has an article comparing REXX in OS/2 with AREXX in a recent InterREXX newsletter. He can be reached via the Internet at callaway@indirect.com.

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All the Threads, All the Time

Weaving multithreaded applications in REXX. By Scot A. C. Gould

All versions of Microsoft DOS executed programs, so they necessarily supported a thread of execution. OS/2 is unique, however, in that it supports multiple threads of execution within a single process. In other words, a program can execute in two or more spots in its code at the same time."

—Gordon Letwin, *Inside OS/2*, 1988.

With those words, Microsoft's chief architect for systems software attempted to distinguish DOS from a new operating system—OS/2. The ability to multitask has been a design goal of nearly all modern desktop operating systems and environments, including Apple's Macintosh OS, Windows 2.x through Windows 95, Windows NT, and all flavors of UNIX. What distinguishes OS/2 from some of these products, notably the Mac OS and Windows 2.x through Windows 3.x and somewhat Windows 95, is its ability to run multiple threads simultaneously.

OS/2 is a multitasking, multithreaded, operating system, which means that applications written for OS/2 can take advantage of OS/2's ability to run multiple programs as well as multiple subprograms, simultaneously. The addition of threads allows OS/2 to process data and execute code while satisfying its design goal of running, as Letwin wrote, "without reducing the performance and response available from a single-tasking system." This translates into an OS that minimizes the time you have to look at the dreaded hourglass. While we OS/2 users might expect this type of behavior from applications, the concept was quite revolutionary until as recently as the late 1980s, at least for the personal computer.

Who cares about multitasking?

Humans multitask virtually all the time. A parent preparing a meal for an infant will multitask by first pouring the dry cereal into a bowl, adding water, placing it in the microwave to be heated, grabbing the child, placing him or her in a high-chair, checking the temperature of the cereal, heating it some more, giving the child a toy to play with, answering a phone call from Harry's Garage, who's running a special on transmissions, taking the food out of the microwave, and finally beginning to actually feed the child. This process is referred to as *serial multitasking*, as tasks are performed sequentially. Interrupt processing stops the execution of the main task: you stop feeding the baby to answer the phone and return to the feeding after the call's completed.

Humans also perform full multitasking, which involves executing multiple tasks simultaneously. So, you might eat

while writing a letter, talk while driving, or read signs while walking. Even the task of bicycling requires full multitasking: your legs rotate while your eyes watch the road, while your head uses your vestibular system to keep yourself steady.

OS/2 was designed to execute full multitasking, so you

A short history

Since its conception, DOS (including Microsoft's MS-DOS, Digital Research's DR-DOS, and IBM's PC DOS) has been a single-task and single-thread OS designed to execute one application at a time. That's true even if you are using a DOS print spooler or a terminate-and-stay-resident (TSR) program; that TSR, not DOS, provides the code necessary to perform a multitasking execution in the background. Because DOS is a single-tasking OS, it is also non-reentrant, which means that only one program can perform a DOS system call at a time. If the print spooler and a word processor attempt to execute a DOS system call simultaneously, chaos will occur and the system might crash.

In 1985, IBM and Microsoft recognized the need for a more robust operating system for the IBM PC. While both companies independently attempted to create a new multitasking operating system, they eventually combined forces in an attempt to create a single product, OS/2, as both companies felt that multiple operating systems might confuse the market.

The 16-bit versions of OS/2, including OS/2 1.0 (in late 1987), 1.1 (late 1988), and 1.2 (late 1989) retained multitasking and multithreading capabilities from the original design. They were created to execute within the "protected mode" of the Intel 286 processor, a mode for which the processor allows up to 16MB of addressable memory and the ability to isolate programs into separate memory spaces. Although the full 32-bit Intel 386 was scheduled for release in late 1987, IBM felt that because most IBM machines used 286 chips, OS/2 would be developed for that chip. Microsoft believed that the 386 was the best target chip. This difference of opinion had a profound impact on the future of OS/2.

In September 1990, IBM and Microsoft agreed to separate their OS/2 development. IBM would be solely responsible for the development of the 16-bit and 32-bit versions of OS/2, while Microsoft would focus on the OS/2 kernel technology (which would have contributed to OS/2 3.0, but eventually became Windows NT) and the Windows operating environment. This separation also came as a result of Microsoft's successful June 1990 release of Windows 3.0, which took advantage of the 386's protected mode while executing older "real-mode" applications. The rest, as they say, was history.

should be able to download a huge .zip file from a BBS, while your network software checks for e-mail, while your printer prints your latest novel, while your spreadsheet performs a long calculation, while your search program attempts to locate all work involving a recently elected official, while you enter phone numbers into your database. While all these applications are executing, you want your computer to continue to be responsive, hence the need for robust multitasking. And, because at no time do you want a single program to corrupt the system and crash your computer, you need protected-mode programs, each running in a separate section of memory.

To take matters one step further, OS/2's multitasking is preemptive—as opposed to the cooperative multitasking found in Windows 3.x and the Macintosh OS. In cooperative multitasking, a program is given access to the CPU by the operating system, and can hang onto it as long as it likes, holding the entire system hostage to a poorly written application. With preemptive multitasking, the operating system can take the CPU away from a badly behaving application; UNIX, Windows NT, and Windows 95 offer varying degrees of preemptive multitasking (Windows 95 resorts to cooperative multitasking to handle older 16-bit Windows applications).

Listing 1: Mtseek.cmd.

```

/*****
/* MTSEEK
/* rexx multi-threaded program using multiple processes and queues
/* to look through files for the occurrence of some text
/*
/* program does following:
/* 1. starts thread to find text in files
/* 2. as text is found, presents list to user
/* 3. user selects file to edit
/*
/* Command is: mtseek <filespec> <text>
/* Author: S.A.C. Gould 1/95
*****/

/***** MAIN *****/

main:
  /* constants: */
  QueueName      = "MTHREADQUEUE"
  UserThread      = "userthrd.cmd"
  ProcessThread   = "procthrd.cmd"
  ProcOvrSem      = "\MTHREAD.SEM" /* name of file which is semaphore */
  EndQueue        = "ENDQUEUE"

  /* Get Arguments
  parse arg filenames searchtext
  if searchtext = "" then call Help

  /* Initialize functions
  call rxfuncadd "sysloadfuncs", "rexxutil", "sysloadfuncs"
  call sysloadfuncs

  /* If queue is already created, then delete it
  rc = rxqueue('delete', QueueName)

  /* Create the queue. Should check to see if name is same
  /* then set input/output to the queue
  name = rxqueue('create', QueueName)
  rc = rxqueue("set", QueueName)

  /* Use a semaphore to note that queue is active
  call CreateSemaphore ProcOvrSem

  /* Now start thread to get user input
  '@start "User Input" /c /f' UserThread QueueName

  /* start thread to perform search
  '@detach' ProcessThread QueueName ProcOvrSem filenames searchtext

  filenames.0 = 0 /* no files yet

  /* say greeting
  'cls'
  say "***** Text Search by Multitasking *****"

```

cont'd on p. 30

Who cares about threads?

How does multithreading improve on multitasking? Do humans execute multiple threads? A short-order cook does. Let's say there are three orders: eggs and toast, waffles with strawberries, and blueberry pancakes. Preparing each order is a separate task or, three processes. Cooking each food item (such as eggs or pancakes) could be thought of as executing an individual thread. OS/2 multitasks each thread, not merely each process. When you launch a native OS/2 application, OS/2 creates a process and loads the program into memory. Within that process, a main thread is executed, then separate individual secondary threads (and possibly tertiary threads) are executed if the code is included. Each of these threads is preemptively multitasking simultaneously. If you're running a DOS or 16-bit Windows application under OS/2, the entire application is contained in one thread.

Does threading help your applications? Absolutely! A good example of a multithreaded application is the Workplace Shell; double-click on folders, double-click on applications, double-click on subfolders. While the applications and the graphics within folders might require time to load, the Workplace Shell is nearly always responsive to your next command. You rarely see the "please wait" clock on the desktop, unless the pointer is on top of a loading folder, because every time

Listing 1: *Cont'd from p. 29.*

```

say
say "          ***** Display Window *****"
say

/* Process queue until completed */
do while message <> EndQueue

    do while queued() = 0 /* is there anything in the queue? */
        call sys sleep 1 /* don't keep constantly checking */
    end /* do */

/* get messages */
do while queued() <> 0
    pull message
    if message = EndQueue then
        signal cleanup
        call ParseMessage message
    end
end /* do while not end of queue*/

/* now destroy the queue and delete semaphore */
cleanup:
call DeleteSemaphore ProcOvrSem
rc = rxqueue('delete', QueueName)

exit

/***** PROCEDURES *****/

/* Creates zero length file to represent semaphore */
CreateSemaphore: Procedure
    semname = arg(1)
    ok = stream(semname, 'c', 'open write')
    ok = stream(semname, 'c', 'close')
    return

/* Destroys semaphore by deleting file */
DeleteSemaphore: Procedure
    semname = arg(1)
    ok = sysfiledelete(semname)
    return

/* processes the message based on the sender */
ParseMessage: Procedure,
    expose filenames.
    message = arg(1)

/* need to parse message into sender handle and information
parse var message handle information

select /* check to see who sent data
when handle = "USER" then do
    call ProcessUser information
end

```

cont'd on p. 31

Listing 1: Cont'd from p. 30.

```
when handle = "FILE" then do /* add filenames to list */
    call ProcessFile information
end

otherwise
    say message
end /* select */
return /* ParseMessage */

/* adds a filename to the list of files containing the text */
ProcessFile: Procedure,
    expose filenames.
    data = arg(1)

    n = filenames.0 + 1
    filenames.0 = n

    parse var data filename linenum rest
    filenames.n.fname = filename /* save file name */
    filenames.n.lnum = linenum /* save line with first occurrence of text*/

    say "File:"format(n,3) filename
    return /* processfile */

/* selects the user selected file and starts another
    process by starting the editor */
ProcessUser: Procedure,
    expose filenames.
    fnum = arg(1)
    '@start epm.exe' filenames.fnum.fname "'filesnames.fnum.lnum'"
    return /* processfile */

Help: Procedure
    say "Command:  mtseek filename(s) search_text"
    say "example: mtseek *.* january"
    exit
```

you double-click, the shell starts another thread to open the folder or application. A separate independent thread is waiting for your next command.

Another benefit of multithreading: In a multiprocessor system, where you have more than one 486 or Pentium, thread execution can be divided between available processors to improve performance (see "Imperfect Symmetry," in the October 1995 issue, p. 36).

Writing multithreaded applications

A native OS/2 application isn't automatically multithreaded. The program-

mers must design it to use threads and add the program code necessary to launch threads and shut them down. Programmers who are used to developing applications for DOS or 16-bit Windows, or simply porting applications from those platforms, will need to learn about threads and where and when to use them.

As Eamon Sullivan put it in a *PC Week* editorial (August 7, 1995), where he discussed the hype surrounding Windows 95, "another alarm trigger will be the term 'multithreaded,' which usually just means that the application prints in the background." While background printing is certainly desirable,

superior applications use threads for the tasks that don't require interaction with the user. To develop a good OS/2 application, the IBM CUA (Common User Access) guidelines recommend that threads be launched for any tasks that require more than 0.1 seconds to process.

So, let's say you want to create a simple multithreaded program in which threads communicate with each other. This is called interprocess communication, and OS/2 has several IPC methods built in, such as semaphores, queues, pipes (both anonymous and named), shared memory, and signals. A discussion of any of these methods could fill another article, so let's define the two we'll be using in our sample REXX application.

Semaphores

Semaphores function like flags. When a thread "sets" or "activates" a semaphore, it signals another thread to process some code.

Queues

As the name implies, a queue contains a sequential list of information packets. One thread can start to "stuff" information onto the head of the queue while another thread retrieves the information from the tail of the queue. This process is known as a first-in-first-out (FIFO) queue.

Multitasking in REXX

You don't need a C++ compiler to write a well-threaded application. REXX, the programming language included with OS/2, includes virtual thread management capability. Figures 1, 2, and 3 show the three components of a multithreaded REXX program, called MTSEEK, which is similar to PMSEEK, one of the better

applications included with OS/2. MTSEEK is a command-line program that searches files for the occurrence of specified text. To execute this program, drop to an OS/2 command prompt and type:

```
mtseek <filespec> text
```

<Filespec> refers to either a file or collection of files (such as *.txt), and text refers to specified text that might be found within those files. MTSEEK creates a second OS/2 window that accepts user input while the main window lists the files that contain the desired text. Unlike other search programs, MTSEEK continues to search other files, even after it finds the desired text. So, you can edit the file, perhaps by using the EPM editor, while MTSEEK continues its search. MTSEEK is designed as a template for other multithreaded REXX applications.

Listing 2: Userthrd.cmd.

```
/* Userthrd.cmd:
   User thread: this thread gets user input
   and stuffs queue */
/* Constants */
UserExit = 'EXIT'
UserCommand = 'USER'

/* Get queue name */
parse arg qname

UserThread:
/* setting to the queue */
rc = rxqueue("set", qname)

/* say greeting */
say "***** Text Search by",
"Multitasking *****"
say "Information displayed in original",
"window."
```

cont'd on p. 33

How does it work?

MTSEEK is shown in Listing 1. It performs the following tasks in order:

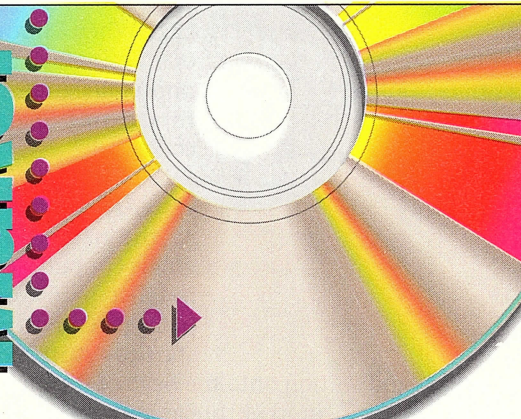
- It creates a queue so that secondary threads can communicate.

- It creates a semaphore (a flag) so that the main thread can tell secondary threads to close.
- It starts a secondary thread that opens a window for user input by running *userthrd.cmd*.
- It starts a secondary detached nonwindow thread to search the files for the text by running *procthrd.cmd*.
- It starts a loop and waits for messages to come through the queue. When it receives a message, it parses it and decides whether a file has been found and should be listed, or if the user should edit one of the files. The queue is created using some of the REXX utilities that come with OS/2. The

semaphore is, in fact, a zero-byte-length file, which other threads can check for existence.

The first secondary thread, *userthrd.cmd*, is shown in Listing 2:

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- It opens up the queue so that it can stuff it with user input for the main thread to process.
- It starts a loop to obtain information from the user, for example, which file to edit or whether to exit.

The second secondary thread, *procthrd.cmd*, is shown in Listing 3:

- It opens the queue to pass information to the main thread.
- It uses the REXX utility *SysFileTree* to find all the files marked by the user's file specification.
- It loops through the files found by *SysFileTree*. Within the loop, it examines the contents of each file and checks to see if the special semaphore file has been deleted. If set, the thread terminates.
- If a file contains the desired text, the

Listing 2: Cont'd from p. 32.

```
say "Enter input in this window."
say

/* start sending commands */
do while string <> UserExit

  Say "To edit file, select by filename",
  "('exit' to quit): "
  string = LineIn() /* dont use pull */
  parse upper var string string

  if string <> UserExit then do
    msg = UserCommand string
    queue msg
  end
end /* do until exit */

queue "ENDQUEUE" /* destroy queue */
exit
```

thread sends through the queue the main thread, the name of the file, and the line on which the first occurrence of the text is found.

In reality, the secondary threads

(*userthrd.cmd* and *procthrd.cmd*) are not true sub-threads but individual processes that run single threads. However, these processes, working together, act as a multithreaded application. There are external functions available for downloading to provide true multithreading capabilities.

Enter the program with your editor, saving all three files, or download them from CompuServe (look in OS2AVEN forum, library 2, for *thread.zip*). First, try the program by placing the files at the root directory and looking through the drive for the occurrence of the word "help." The correct command is:

```
d:> mtseek *.* help
```

You might need to physically position the two windows so that you can enter text in one window and see the list in the other.

While multitasking is important, threads make an application truly responsive. Hopefully, this article will

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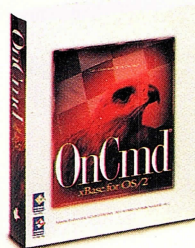
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Listing 3: Procthrd.cmd.

```

/* PROCTHRD.CMD */
/* This thread perform some calculation. For this example*/
/* this thread finds selected files and searches text within
files. */

parse arg qname semname filenames searchtext

MainThread:
/* setting to the queue */
rc = rxqueue("set", qname)

Call SendMessage "Searching for files...Please wait..."

/* Get List of files commands */
ok = SysFileTree(filenames, 'files.', 'FS0')
call SendMessage "Now searching each file."

/* search each file */
do i = 1 to files.0
/* if no semaphore present stop processing */
if \SemaphorePresent(semname) then
signal cleanup
/* otherwise search the file for the text */
if SysFileSearch(searchtext, files.i, 'lines.', 'N') = 0,
& lines.0 > 0 then do
message = "FILE" files.i lines.1
call SendMessage message /* report file found */
end
end /* for each file */

call SendMessage "End of list."

Cleanup:
/* some clean up could occur here */
exit

SendMessage: Procedure,
expose semname
message = arg(1)

if SemaphorePresent(semname) then
queue message
else
signal Cleanup

return

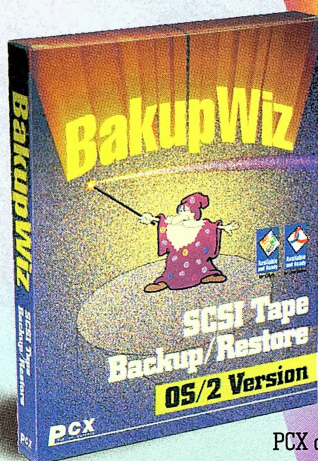
SemaphorePresent: Procedure
return stream(arg(1), 'c', 'query exists') <> ''

```

help you to build your own multi-threaded applications.

Scot A. C. Gould is the president of Inland Empire OS/2 Users and an assistant pro-

fessor of physics at the Claremont Colleges specializing in atomic force microscopy. He can be reached at 70372.545@compuserve.com or via the Internet at scot_gould@krupp.claremont.edu.



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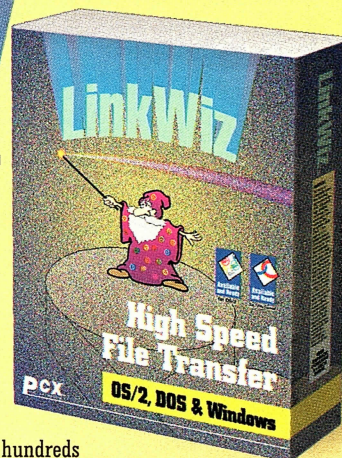
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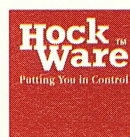
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Debugging From The Inside Out

Defensive programming earlier might mean less debugging later.

By Dean Roddey

An ounce of prevention is better than a pound of cure, and an hour of careful planning is far better than days of painful debugging. Of course, no amount of planning will eliminate all errors, and we all need to maintain a toolbox of debugging software and techniques. Still, it's important to keep in mind your favorite programming language's weaknesses and try to address them before your application explodes during field trials—or worse, after it's been delivered to the customer.

Different programming languages have different weaknesses, but one of the most common categories is the resource leak. For example, structured languages often allow early exits from functions—these exits simplify the program logic and are often a practical solution to messy problems, but they can make resource leaks hard to avoid, especially during maintenance programming. According to the development environment you use, there may be some internal (read intrusive) debugging tools available.

Object-oriented languages tend to have fewer problems with system resource stranding or leakage (see "Writing Exceptionally Robust Software," *OS/2 Developer*, May/June 1995). This advantage comes from the natural encapsulation of dynamically allocated resources within objects, although much can be done in this area regardless of the language. Still, even object-oriented applications must dynamically allocate objects themselves, thus opening the door for leaks of the object's memory and other resources. Another problem happens if you allow a C++ exception to occur within a destructor, which can stop the object's memory from being freed.

Losing your memory

Memory leaks occur when memory is dynamically allocated but never freed. Memory leaks are notorious because they tend to cause the code to only fail in the field after having run for a few days or weeks and rarely when you're doing regression or unit testing. Probably most shipping applications have actual or potential memory leaks in them, which will appear given the right set of circumstances. Some more advanced languages avoid the entire issue by removing the application's responsibility for managing and freeing memory, instead depending upon a scavenger thread that lurks around freeing memory that is lying dormant.

The most effective ally you have here is a heap debugging system. Third-party heap debuggers, such as Smart Heap, are available in addition to built-in heap debuggers like the one in the Visual Age C++ system (compile with the /Tm+ flag). Any heap debugger will likely provide the following aids:

- All allocated buffers are filled with a fill pattern, and freed buffers are refilled with the pattern. This technique can catch a number of errors, such as using a freed buffer or using an uninitialized one. The former is particularly tricky, since a recently freed buffer can be safely accessed nearly all the time. Of course, in the field, another thread will slip in and reallocate the buffer.
- Be aware that buffer filling can cause your development system to act differently from your production code, because filling all allocated buffers causes them to suddenly be fully committed immediately upon allocation. So don't try to profile your app's memory usage patterns with this kind of debugging turned on.
- Heap debuggers are capable of dumping out the currently allocated buffers. This is done at shutdown in order to find all unfreed buffers or periodically in repetitive code (the code most likely to cause problems because leaks add up fast). Some debuggers also identify the line/module where the buffer was allocated. In this case, C++ tends to suffer. All memory is allocated inside some object, so the line/module information is useless because you need to know where the object that allocated the buffer was created.

Finding out after the fact who allocated a leaked buffer can be difficult. If your heap debug system provides a pass count; such as, how many times the `alloc` call was done before a particular buffer was allocated, then put a delayed breakpoint on the allocation call. When it breaks, you are about to allocate the buffer that's stranded, so pull down the debugger's call stack and see how you arrived at this point. This does not work as well with code that is called from multiple threads, because the pass count is often not consistent over multiple runs of the program. The debug dump will also show you some configurable number of bytes of each buffer, which can offer clues as to its origin.

Be aware that, according to where you call the memory dump at shutdown, memory allocated by global memory objects or by the primary stack during startup might still exist, though they will be cleaned up later. Try to put the call at the lowest level possible, but not after the C run time is terminated in your lowest-level DLL. If you put it in the exit list handler for your lowest-level DLL, globals within that DLL may not have been destructed. Potentially, according to your architecture, some things have to be there to the bitter end because of bootstrapping concerns.

- A good heap debugger will allocate a couple more bytes than what was actually asked for and put a special value beyond the end of the buffer. Any overwrite of the buffer by the program causes the next heap check to catch the overwrite of the buffer. Such overwrites can cause subtle side effects. Buffer overwrites in multithreaded applications can cause errors that are almost inhumanly difficult to assess without mechanical aids.

Heap debuggers do wonders in finding memory leaks via run-time library allocation. However, they do have their ups and downs. As discussed above, they significantly affect the memory usage of the program, causing problems that would not otherwise exist. These aids are also intrusive; you must recompile your code to use them. With some third-party debuggers, you may need to include a header in every module; failure to do so may cause massive problems. Some allocations will go to the language run time, while others to the debug version. With built-in language heap debuggers, this is less of a problem because everything eventually gets to the same language run-time allocation system. However, you will still get invalid debugging results if any modules are not correctly compiled.

The turnaround time for deleting a huge system and rebuilding it is often a serious issue, so it's a good idea to keep the debugging code turned on during all development and only turn it off when compiling production code. The heap debuggers I'm familiar with have either multiple debugging levels or a frequency check that adjusts how often the heap is checked, thereby mitigating the performance overhead during debugging. Changing these could involve another compile, though the frequency check value is generally a run-time environment variable, making it easy to adjust as needed.

In the C++ world, if you have many overloaded new or delete operators, potential conflicts with a memory debug system might occur because it must use overloaded operators, usually in conjunction with mapping macros, to pass in the extra information needed to track buffer usage. If the debugger's overloads conflict with your overloads, such that they create ambiguities, the C++ compiler might politely decline to play.

Multiple heaps

The new Visual Age compiler supports multiple heaps; you don't have to allocate everything out of a single process-wide heap. This function has its ups and downs and should not be abused. But, it can provide a certain amount of accountability for subsystems doing rapid or voluminous

amounts of dynamic allocation. In C++ systems in particular, using multiple heaps can be a real problem because of the need to track what memory came from where. Black-box subsystems (particularly those that spawn off internal threads) can benefit from having a separate heap. Because heap access must be synchronized, heap access can become a bottleneck in heavily multithreaded applications. It can, therefore, be a performance benefit to give a multithreaded subsystem its own heap to play with. More importantly, any growth of the subsystem's private heap is almost certainly the fault of that subsystem because only it has access to the heap.

These tools only help you find problems with memory resources allocated by the run-time library. Memory allocated from the operating system directly falls into the general category of system resources, which must be controlled and debugged via different mechanisms.

System resource leaks

There are a number of operating system resources that can easily be leaked without warning—until your application goes belly up. Among them are font IDs, pointers/bitmaps, presentation spaces (PSs), windows, and system memory (allocated for various purposes).

Font IDs. Font IDs cause a number of complications. However, because a per-process font ID limit of 255 exists, losing font IDs is generally fatal enough that it will be caught during significant use testing. Since most applications allocate and free font IDs in a symmetric fashion, any leakage is usually easy to catch. Failure to use `GpiQueryNumberSetIds()` and `GpiQuerySetIds()` to control the allocation of font IDs (and failure to use a semaphore to synchronize access to them) will cause both font ID leaks and other general font ID problems. In very simple programs, this action might be overkill, but any serious application or common library code should use these underdocumented APIs to manage font IDs. Once you have gotten the next available ID, you call `GpiCreateLogFont()` before you release the synchronization semaphore. Otherwise, another caller can get the same ID before you get it into use. This happens because the set ID query APIs consider it available until used to create a logical font.¹

Pointers and bitmaps. A particularly easy error to make is passing TRUE for the third parameter to `WinQuerySysPointer()`, thus creating a copy of the system pointer that must be freed by the application. Accidentally using this form of the API can cause a few pages (4K per page) to be lost on each call. If called repetitively, it will quickly eat up system memory.

Presentation spaces are easy to lose because of the already complex state-based nature of the `WM_PAINT` handling code of many applications. Most applications use cached PSs, which are in limited supply. However, because many apps do not check the success of `WinBeginPaint()`, the failure is not always obvious. Leaking noncached presentation spaces can be worse since their number seems to be limited purely by system memory and swap space. What's worse is that almost any debugger is going to cause unnatural display interactions with the application being debugged. Because the loss of presentation spaces tends to occur in

paint code, this interaction can seriously interfere with debugging attempts.

The documentation for `WinDestroyWindow()` indicates that menu windows with bitmapped items will not destroy those bitmaps when the menu is destroyed. It seems an application, which constantly destroys and reloads menus, can cause a memory leak.

Presentation spaces. If you create presentation spaces (PS) via `GpiCreatePS()` and then associate them with windows, you're responsible for destroying the PS. The destruction of the window will disassociate the PS but not destroy it. Presentation spaces gotten via `WinGetPS()` will be destroyed automatically by the window's destruction.

Windows. If your application switches parentage of windows to the desktop or system object window, you can easily destroy the parent window and assume that all child windows will be destroyed. However, automatic destruction of child windows is driven by parentage, so an object window parented window will often need to be destroyed manually. The new Visual Age debugger has a very nice window analyzer that can help you catch many of these error types. It provides an exploded view of your windows in which you can click on a window and have it highlighted in the two information windows around the exploded view. These information windows give you the information about the selected window. And, you can work the other way by selecting the window in the lists and see it in the exploded view.²

System memory. System-allocated memory blocks are behind all PM resources and some IPC resources like OS/2 queues. There are no intrusive software tools that I know of that will track your system memory usage; however, external tools like IBM's Theseus (part of the SPM/2 package) will help. Theseus can track system memory blocks and categorize them in a number of ways.

Named system memory blocks are quite safe. You can't create multiple copies, because the operating system will prevent it. You can only open an existing named memory block. Once all openers of a shared memory block have terminated, the memory is freed. But don't use this option as a suggestion to avoid memory leaks. Making all your named memory shared memory would be extremely abusive.

Encapsulation strategies

Leaks of these resources can cause errors in the field every bit as weird as run-time library memory leaks and buffer overwrites. If you are not using a third-party class library or abstraction API, you shouldn't allocate resources such as these out in the open. Create a small set of APIs through which you allocate and free them. These APIs can keep local statistics on the usage of system resources and log warnings when their usage patterns indicate a leak. These types of leaks are particularly horrendous when a program is lax about checking error returns from `Gpi/Win` APIs. The inability to allocate a resource will be undetected, causing a seemingly unrelated, spurious failure somewhere down the line.

Failure to implement some sort of encapsulation strategy will come back to haunt you later when a resource leak is suspected. There are few tools that can help you ascertain if you are leaking a specific type of system resource. They will

Glossary

Heap debugger. In C/C++, all memory not used statically by a program is dynamically allocated from a heap. The language run time (see RTL below) provides one or more heaps from which memory can be allocated. A heap debugger plugs into the heap management code and keeps detailed information about all allocated memory, as well as providing other useful assists. These tools can be external to the language or built into it.

Kernel debugger. Developers have access to a special debugger that replaces some of the `.dlls` of OS/2 itself. These plug-in replacements have special code in them that communicates with a debugging terminal over a serial line. This kernel debugger has unprecedented access to the inner functions of OS/2, but this information might not tell you much. A lack of good documentation limits the usefulness of the kernel debugger, however, it still is a powerful tool to those brave enough to learn it.

RTL Run-time library. The basic libraries provided by the language vendor. Most programs do the vast majority (if not all) of their dynamic memory allocation via the language run time. So an RTL that tracks memory and resource usage is a powerful tool.

Test harness. Because `.dlls` have very loose or limited connections to their host applications, it's often easy to write a program that connects to it solely to beat on it in an inhumanly abusive manner. Such abuse can expose timing and thread re-entrance problems.

Theseus. A program from IBM that works in conjunction with its own device driver to provide access to massive, though often murky, amounts of information about the state of a process and its threads.

Watchdog. In a multithreaded, multitasking operating system, it's often convenient to create a second process or a thread within the same process that will watch certain program states for signs of problems. The watchdog can then log the relevant information and restart the application or intervene to allow the program to continue. Or, the watchdog can just continuously log snapshots of the program's state for later perusal. Such a vapor trail can often be used to recreate the scenario that caused the problem.

An obvious example is a thread that posts a message to the main PM thread and expects a response. If it doesn't get one within a certain time, perhaps because the PM queue is hosed, it can restart the machine. Sometimes this is a requirement for unattended software in the field, but it can also be used during testing to track the patient's health unwaveringly over long periods of time.

certainly tell you that you are leaking something, but not often what you are leaking.

Theseus and the kernel debugger

Two external tools can help you in the area of system resource leaks. IBM's Theseus program can give you significant information about memory usage. It does not, though, understand what resource type is using that information. The program can be obscure to learn but well worth the effort. It's particularly adept at assigning used memory pages to particular `.dll` or `.exe` modules. Be careful when interpreting memory usage reports, because OS/2's extreme attempts to minimize memory working sets can sometimes cover the tracks of the real culprits, causing you to point the finger at innocent parties.

The kernel debugger can help with PM resource leaks by,

upon process shutdown, displaying a list of some allocated PM resources such as pointers and accelerator tables. It will not tell you where the leakage occurs but just knowing what has leaked can often solve the problem. If running subsystem x 10 times creates 10 times more unfreed bitmaps, you can be pretty sure that subsystem x is leaking bitmaps. You can also put breakpoints on the system APIs, which allocate or deallocate the resources and watch them as the program runs. However, it might be like searching for a needle in a haystack if your application is large and multithreaded.

The kernel debugger's greatest limitation lies in its almost total lack of documentation. Documentation on how to use the debugger itself exists but limited information is given on where to poke around in the system to find the necessary information.

Test harnesses

One of the most difficult testing strategies for a company to justify is the creation of test harness code. The kind of code that encapsulates system resource allocation and deallocation tends to be in shared DLLs. It's logical then, to write a test harness program that beats soundly upon the code to test stability, performance, and its reported usage metrics against the canned usage pattern test. Test harnesses can probe known problem areas and do heavy multithreaded access to test re-entrance problems. Having the evidence that an encapsulation subsystem works, and continues to

work after each modification, is a great mental aid. Once confidence in the encapsulation is high, assignment of blame for leakage problems becomes simpler and more often correct the first time.

This kind of automated testing can do more to ensure the stability of a system in the field than anything else. However, it requires substantial effort and creates no sellable code, so it almost always ends up on the back burner. Such testing code must be developed with extreme care so it cannot be hacked together or just dumped on the latest incoming programmer.

Testing error returns

One of the most egregious programming errors made in OS/2 development (and particularly in PM development) is the failure to check every API for error returns. The effort involved in doing this testing can be huge, which is another reason why operating system APIs should not be called out in the open. Encapsulating all system APIs allows all calls to be error tested. Failure to test every return almost always causes confusion because the eventual domino effect, which causes the program to fail, will seem to be inexplicable.

Conclusion

The larger the application and the bigger the development team, the greater the need to plan your project carefully. From understanding where resource leaks occur, to knowing what tools you have at your disposal, an ounce of prevention truly is better than a pound of cure.

Footnotes

¹ Another possibility, in controlled circumstances, is to divide the 255 font IDs into a set of subranges. Each of these subranges can be given to a particular subsystem to use as needed. This action avoids the overhead of constantly calling the set ID query APIs and the possibility of separately written code accidentally using someone else's font IDs. I could not personally recommend this unless your performance needs are very high and your code base relatively small or specialized.

² Frame windows are the exception to the rule. They will destroy all of their owned windows as well as their child windows, because the frame has some windows which are temporarily switched to other parent windows.

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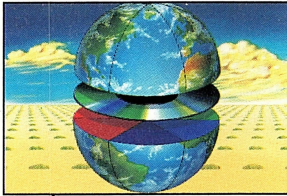
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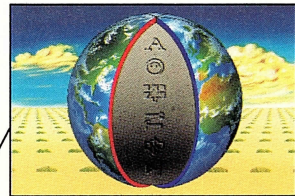
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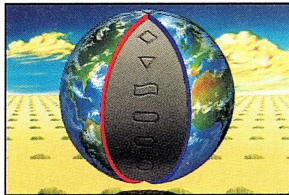
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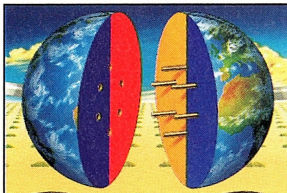
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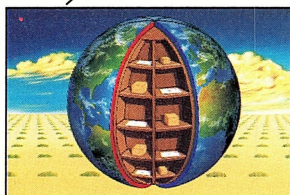
Network Connectivity



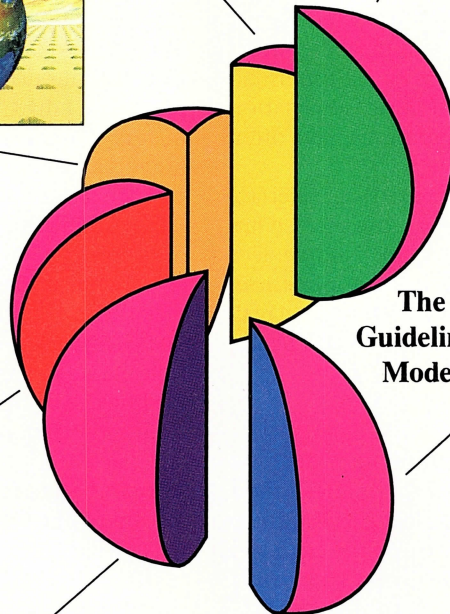
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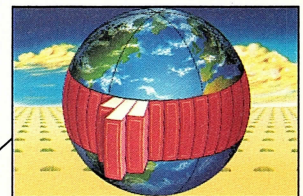
The Message layer is fully compatible with all current Object Request Broker (ORB) standards. JOT verbs provide a single interface to current technology and the OO of tomorrow. Guidelines provides CORBA IDL and IBM SOM support.



The Guidelines Model



The Repository



The repository supports and surrounds the entire programming environment with the facilities for teamwork development. Databases can be created on multiple hosts from a single definition. Data definitions can be directly imported into a GUI program.

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Moving to OOUI

Getting the most from the Workplace Shell in client-server applications.

By Fabrizio Aversa

The world of finance and bank computing is largely dominated by old character-mode terminals running mainframe or minicomputer-based central applications. Only in the last few years has some effort been made to improve old software. Most of these innovations have been directed at the redesign of the user interface using the graphical user interface (GUI) model. The resulting products have been usually better than their predecessors in presenting information and in performance, but their basic operations have often remained the same.

Let's look at how adding an object-oriented user interface (OOUI) and object-oriented application logic can go even further to increase end-user productivity. As an example, let's examine a financial portfolio management application, which handles a variety of investment products and is a real-life example thanks to OS/2's Workplace Shell (WPS) and System Object Model (SOM).

Why Workplace Shell?

A couple of years ago I was asked to present a project for the information system of a medium-sized financial firm, which had already been shown a system using a GUI under OS/2. I realized that, if I wanted to acquire the firm as a client, I had to show something innovative and appealing that would convince them to drop the conventional GUI solution and adopt an OOUI system that would be built from scratch.

During the requirement-gathering sessions with the portfolio managers and the brokers—who were the end-users—I pointed out two issues that a GUI application could not address correctly and are actually relevant for other application areas as well: multitasking and consistency.

A need to multitask

One issue is speed through multiple concurrent user activities. Suppose you are a broker and you are placing an order for a client using a GUI program. You probably have to navigate some menus and fill a couple of preliminary dialogs—and there you are, filling the dialog with the order data.

If, during this activity, you receive a phone call from another client asking to place another order, you'll probably write down the data on a memo sheet till you're finished with the first order. The result is that you end up with a stack of yellow memo sheets dispersed around and you need to submit one after the other to your computer.

Of course you can ask your software developers to make all dialog windows modeless and your application multi-threaded, so that you can begin a new operation before the end of the previous one. Unfortunately, it's unlikely that you will use these OOUI, as you could easily forget the state of the suspended operations. This is different, however, if you are in the Workplace Shell. There, each order might be a color icon on your desktop. You create them by dragging a template and edit it with direct manipulation and context menus. You can't forget where you are, since the state of an order is apparent.

For example, you can specify the product that an order is relative to by simply dropping the product's object onto the order object.

When the phone call arrives, it is very natural for you to pick the order template, drag it over the desktop, and work on it. This action is equivalent to writing orders data on multiple memo sheets, the difference being that now you are also feeding the computer. In other words, you're saving a lot of time and you don't have to remember anything.

A consistent interface

Another issue is how to handle different investment products with a uniform user interface.

A traditional GUI-based program presents a different path in the menu tree for each different instrument. Consider a cash withdrawal and the purchase of stock shares; they are indeed very different things. In the portfolio manager's mind, on the other hand, every operation is just a transaction on an investor account.

Using the WPS you can get rid of the complexity of instruments by representing them as different WPS objects. The details and different possible actions on each instrument are encapsulated in the WPS object just like a C++ or SOM object encapsulates data. The buy or sell operation relative to one instrument and one account is represented by another WPS object—the "deal." You drag and drop on a deal an instrument and an account icon and enter data through the settings notebook. This is a precise metaphor of what a financial operator does on paper, so no mental shift is needed.

Once our client was convinced by the arguments presented and by a Smalltalk prototype, the project, named FinSin (Financial Support by Integration), was started. We chose an all-IBM environment with OS/2 Warp, VisualAge for C++, SOMobjects, and DB2 for client/server database access.

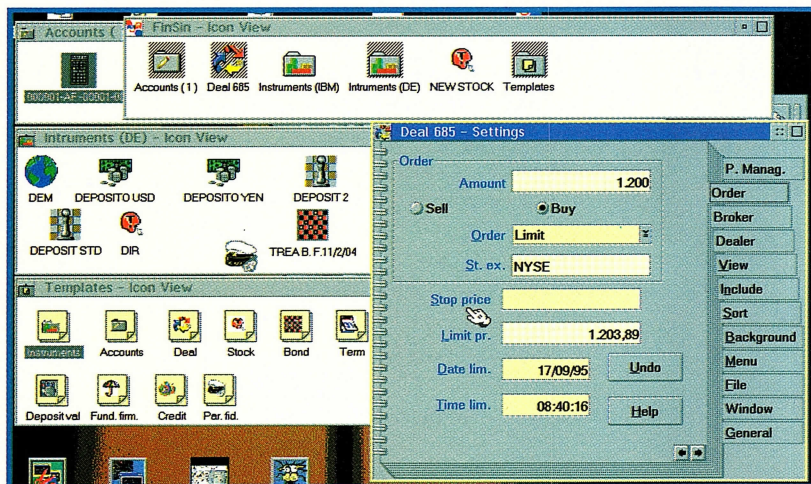


Figure 1: Settings notebook for the FinSin object.

System design

Let's take a look at a typical working session before analyzing the implementation details.

FinSin has a main folder, (the only instance of the

FsWpMain class) named **FinSin** on the desktop (Figure 1). It is the main FinSin WPS object. After installation, it contains only the FinSin Templates folder; kept separate from OS/2's template folder. The settings notebook of the main object contains general information such as the user name, company, and database name.

When using FinSin, the first thing the operator will probably do is create an instance of the Account Folder and of the Instrument Folder, dragging the corresponding templates and using their settings views to enter the range selection.

She will then open these folders that will be populated with accounts and instruments retrieved from the DB2 database according to the range selection.

If a new instrument is needed, such as a new company's stock, the operator simply drags the stock template on to the desktop and enters data in the settings notebook.

The action of deal creation, which is usually done using the "deal" template, can be speeded up by dragging an

Listing 1: Adding views using a class library.

```
/* method to add a settings notebook page, */
/* call this from */
/* _wpAddSettingsPages, */
/* that you must override */
SOM_Scope ULONG SOMLINK
fswpbond_addSelectionPage(FsWpBond *somSelf,
Environment *ev,HWND hwndNotebook)
{
    PAGEINFO pageinfo;
    CHAR pszTitle[30];
    HAB hab;

    FsWpBondData *somThis = FsWpBondGetData
(somSelf);

    FsWpBondMethodDebug("FsWpBond","fswpbond_addS
electionPage");

    strcpy(pszTitle, "Bond");

    memset((PCH)&pageinfo,0,sizeof(PAGEINFO));
    pageinfo.cb =
sizeof(PAGEINFO);
    pageinfo.hwndPage = NULLHANDLE;
    pageinfo.usPageStyleFlags = BKA_MAJOR;

    pageinfo.usPageInsertFlags = BKA_FIRST;
    pageinfo.pfnwp = bond1DlgProc;
    pageinfo.resid = hmodThisClass;
    pageinfo.dlgid = ID_BOND1;
    /* resource id */
    pageinfo.pszName = pszTitle;
    pageinfo.pCreateParams = somThis;
    /* pass instance data */
    pageinfo.idDefaultHelpPanel = 258;
    pageinfo.pszHelpLibraryName =
pszHelpLibraryName;

    return somSelf->wpInsertSettingsPage(
hwndNotebook, &pageinfo );
}

/* dialog procedure for the page added to the*/
/* settings notebook of the FsWpBond WP class*/
MRESULT EXPENTRY bond1DlgProc(HWND hwndDlg,
ULONG msg,
MPARAM mp1, MPARAM mp2)
{
    FsWpBondData *objData;
    /* Bond1Dialog is an IBM Open Class */
    cont'd on p. 44
```


Listing 1: Cont'd from p.43.

```

/*Library dialog inheriting          */
/* from IFrameWindow                */
Bond1Dialog * bondD;

switch (msg)      /* Determine message class */
{
    case WM_INITDLG:

        /* get wp object pointer to data and */
        /* pass it                            */
        /* to dialog constructor so that      */
        /* the dialog can access wp object    */
        /* instance data                       */
        objData= (FsWpBondData *)mp2;
        bondD= new Bond1Dialog(hwndDlg,
objData);
        break;

    case WM_DESTROY:
        break;

}

return(WinDefDlgProc(hwndDlg, msg, mp1,
mp2));
}

/* code to be inserted in wpOpen to handle a
view */
if(ulView == OPEN_MY_VIEW) {

    /* specify data for view */
    PVIEWDATA pvd=
(PVIEWDATA)somSelf->
wpAllocMem(sizeof(VIEWDATA), NULL);
    pvd->useItem.type= USAGE_OPENVIEW;
    /* id of the opening view, to be used by
functions
    querying view info (as wp delete
fromobjuselist) */
    pvd->viewItem.view= OPEN_MY_VIEW;

    somSelf->wpAddToObjUseList(&(pvd->
useItem));

    /* BondDialog is an IBM Open Class
Library dialog inheriting */
    /* from IFrameWindow */
    BondDialog * bondDialog= new
BondDialog(hmodThisClass,
somSelf, pvd);
    bondDialog->show();

    if(!somSelf->
wpRegisterView((HWND)bondDialog->handle(),
"Bond view"))
        DebugBox("wpRegisterView fail","");

    return (HWND)ownDialog->handle();

}

/* code to be inserted in          */
/* wpDeleteFromObjUseList           */
/* when you dismiss your dialog.    */
/* Remember to call                 */
/* wpObj->wpDeleteFromObjUseList     */
/* (&(pvd-> useItem))               */
/* from BondDialog::command, wpObj  */
/* and pvd are passed to the        */
/* dialog constructor in wpOpen */
/* if(pUseItem->type == USAGE_OPENVIEW) */
{
    /* closing an open view,          */
    /* see which view is closing       */

    PVIEWITEM pvi= (PVIEWITEM)(pUseItem+1);

    switch(pvi->view) {
        case OPEN_MY_VIEW:
            /* insert the code you want to be */
            /* executed when                    */
            /* your view is closed              */
            break;
    }
}

```

instrument on an account. When the instrument is dropped, a deal is created containing that instrument and that account. The settings view is automatically opened for data entry, and the execution is driven by a context menu item.

Context menus are also used to start Presentation Manager (PM) executables. They perform tasks that are relative to the objects to which they belong. For example, a

report on an account status is done by a program started by a context menu item of that account. The PM **WinStartApp** API is called, and the account name is passed as a command line parameter.

In this way, the main user interface (UI) functions are handled by the WPS, while accessory functions, that can be computationally heavy, are executed in separate processes.

System implementation

In the FinSin architecture, a sharp separation has been made between UI objects and application logic (AL) objects. Each investment instrument is represented by an AL SOM class, encapsulating relevant data and exposing to the outside world only public methods as the method for interest calculation or automatic price update.

For most AL classes, there exists a corresponding WPS class, usually providing data view/update capabilities implemented

as new pages on the setting notebook or in new views. Since WPS classes are implemented in SOM, this correspondence is easy. Each WPS object simply contains an AL object as an instance variable. The inheritance tree of WPS classes relative to financial instruments follows closely the tree of the AL classes.

I won't bore you with the cumbersome details of the system's financial logic. I'll give only a short example of how to use the object-oriented nature of the WPS to represent the AL. The AL objects representing stocks and bonds inherit

Listing 2: Server access serialization.

```
SOMObject * getServer(HMTX * phmtxServ)
/* get pointer to FsServer from FsWpMain */
{
    SOMClass * clsMain;
    WPObject * objMain;
    SOMObject * serv;
    somMethodProc * methodPtr;
    somId id;

    /* taken from fswpmain.h (you must */
    /* include it anyway) */
    typedef SOMObject* SOMLINK
    somTP_FsWpMain_getServer(FsWpMain *);
#pragma linkage(somTP_FsWpMain_getServer,
system)
    typedef somTP_FsWpMain_getServer
    *somTD_FsWpMain_getServer;

    /* gain ownership of semaphore */
    /* set handle to 0 to notify we're */
    /* opening a named semaphore */
    *phmtxServ=0;
    if(DosOpenMutexSem("\\SEM32\\FsSvrSem",
phmtxServ)) {
        DebugBox("getServer", "cannot open
semaphore");
        return (SOMObject *)NULL;
    }

    if(DosRequestMutexSem(*phmtxServ, 15000)) {
        DebugBox("getServer", "Server in use, try
again later");
        return (SOMObject *)NULL;
    }

    id = somIdFromString("FsWpMain");
    clsMain= _somFindClass(SOMClassMgrObject,
id, 0, 0);
    SOMFree((VOID*)id);

    if(!clsMain) {
        DebugBox("getServer", "cannot locate
wpmain class");
        return (SOMObject *)NULL;
    }

    objMain=_wpclsQueryObject(clsMain,
WinQueryObject("<FinSinMain>"));

    if(!objMain) {
        DebugBox("getServer", "cannot locate
wpmain object");
        return (SOMObject *)NULL;
    }

    id = somIdFromString("getServer");
    _somFindMethod(clsMain, id, &methodPtr);
    SOMFree((VOID*)id);

    if(!methodPtr) {
        DebugBox("getServer", "cannot get
method");
        return (SOMObject *)NULL;
    }

    serv=
(((somTD_FsWpMain_getServer)methodPtr)
(objMain));

    if(!serv) {

        LogEventString("getServer", "NULL
FsServer returned");

        /* release ownership of semaphore */
        if(DosReleaseMutexSem(*phmtxServ)) {
            DebugBox("releaseServer", "cannot
release semaphore");
        }
        if(DosCloseMutexSem(*phmtxServ)) {
            DebugBox("releaseServer", "cannot
close semaphore");
        }
    }

    return serv;
}
```


Listing 3: Populating a folder with DB2 rows.

```

SOM_Scope B00L SOMLINK fswpacfl_wpPopulate(
FsWpAccountFolder *somSelf,
ULONG ulReserved,
PSZ pszPath, B00L fFoldersOnly)
{
    ULONG ulngFolderFlags;
    CHAR pszNextAccountName[40];
    boolean booOpenCursor;
    SOMObject * serv;
    HMTX hmtx;
    WPObject *objAct;
    ULONG iNoObjs;
    somId id;

    FsWpAccountFolderData *somThis =
    FsWpAccountFolderGetData(somSelf);
    FsWpAccountFolderMethodDebug
    ("FsWpAccountFolder",
    "fswpacfl_wpPopulate");

    /* get flags before calling parent method */
    ulngFolderFlags=
    _wpQueryFldrFlags(somSelf);

    if(!

FsWpAccountFolder_parent_WPFolder_wpPopulate
(somSelf,
    ulReserved,
    pszPath,
    fFoldersOnly)
    ) return FALSE;

    /* check if template */
    if(_wpQueryStyle(somSelf) &
    OBJSTYLE_TEMPLATE) return TRUE;

    if (
    (ulngFolderFlags == 0) ||
    (ulngFolderFlags == FOI_FIRSTPOPULATE) ||
    ((ulngFolderFlags & FOI_ASYNCREFRESHONOPEN)
    &&
    (ulngFolderFlags & FOI_POPULATEINPROGRESS))
    ||
    ((ulngFolderFlags & FOI_REFRESHINPROGRESS)
    &&
    (ulngFolderFlags & FOI_POPULATEINPROGRESS)
    )
    ) {

        /* get server */
        serv= getServer(&hmtx);

        if(!serv)
        DebugBox(_wpQueryTitle(somSelf),
        "Cannot get server");

        if(serv) {

            booOpenCursor=TRUE;
            iNoObjs = 0;
            while (getNextAccountHandle(serv,
            pszNextAccountName, &booOpenCursor,
            _lngCodCliFrom,
            _lngCodCliTo, _pszType)) {

                /* see if this object is already */
                /*in folder */
                objAct= _wpQueryContent(somSelf,
                objAct, QC_FIRST);
                if(objAct) do {

                    if(!strcmp(_wpQueryTitle(objAct),
                    pszNextAccountName)) {
                        /* refresh object */

                        /* exit loop on folder */
                        /*content */
                        break;

                    }

                } while(objAct=
                _wpQueryContent(somSelf,
                objAct, QC_NEXT));

                id =
                somIdFromString("FsWpAccount");

                /* create object if not found */
                if(!objAct)
                if (! (objAct=
                _wpclsNew(
                _somFindClass(SOMClassMgrObject,
                id, 0, 0),
                pszNextAccountName,"", somSelf,
                TRUE)
                )) {
                    releaseServer(&hmtx);
                    DebugBox("FsWpAccountFolder",
                    "cannot create obj");
                    SOMFree((VOID*)id);
                    return FALSE;
                }

                SOMFree((VOID*)id);

                /* flag as being one of the */
                /* actual DB cursor rows */
                _wpSetError(objAct,
                WPERR_INVALID_OBJECT);
            }
        }
    }
}

```

cont'd on p. 47

Listing 3: *Cont'd from p. 46.*

```

    } /* end of while on DB instruments */

    releaseServer(&hmtx);

    /* delete object not flagged as      */
    /*being one of the actual DB        */
    /*cursor rows */
    objAct= _wpQueryContent(somSelf,
objAct, QC_FIRST);
    if(objAct)
        for(;;) {

            /* objAct pointer shall be      */
            /*no longer valid after          */
            /*deletion, so get now next item*/
            WPObject

            *next=_wpQueryContent(somSelf, objAct,
            QC_NEXT);

            if(_wpQueryError(objAct) !=
            WPERR_INVALID_OBJECT) {

                if(_wpDelete(objAct, 0) !=
            OK_DELETE) return FALSE;

            } else {
                /* reset flag */
                _wpSetError(objAct, 0);
            }

            if (!(objAct= next)) {
                break;
            }

            } /* end of loop on content */
        } /* end of if got server */
    } /* end of if not yet populated */
    return TRUE;
}

```

from the object **Product**, containing data and methods relevant for both.

The same inheritance has been implemented for the corresponding WPS objects. Both stock and bond WPS objects have a context menu item for price update, which calls the corresponding method in the AL object **Product**. Instance variables can be edited in pages added to the settings notebook by each WPS class. So the **Product** WPS object adds a page both to stock and bond WPS objects, each of them adding their own pages as well.

When you define views for your WPS class, it's easier to code the PM part using a C++ class library. Listing 1 demonstrates how to add a page to a settings notebook and how to add a new view to an object.

Once we have implemented SOM classes for all AL objects

(in our financial example we have 14 classes for instruments and one class for operations) we have to develop all the functions that use these classes to accomplish applicative tasks. For example, the deal execution is a function using an account and an instrument—data retrieved from the database and user-entered data to generate a set of operations.

All these functions are collected in the **FsServ** class, which is a class that is an instance variable of the main **FinSin** WPS object.

This server object is also responsible for database operations, including login and logout. These transactions are handled by the **FsDbas** SOM class, whose only instance is an instance variable of the server object.

You can have different **FsDbas** implementations for different databases. Due to the SOM binary compatibility, simply replace this class's Dynamic Link Library (DLL) to change the supported database.

The AL classes, up to **FsServ**, are not dependent on the actual UI used. Therefore, instances of them can be created within WPS, PM, and character-mode programs. The accessory applications for reports use this technique to reuse all of the AL code developed.

The AL part of **FinSin** can easily be distributed across address spaces using DSOM. They could even be recompiled under another operating system supporting SOM and DB2, such as AIX or MVS.

Multi-operating system environments, with OS/2 clients and distributed applications, are probably the future of business data management systems.

Multithreading

The database and data-processing functions are grouped in a single class to coordinate database access. Since the WPS is highly multithreaded, and you don't know when your code will be called and by whom, it's very likely that multiple database accesses will be required simultaneously.

There are two ways to handle the situation:

- create an instance of **FsServ** for each concurrent operation
- serialize the access to the single instance of **FsServer**.

The first option involves multiple connections to the database, and this is a time-consuming and network-heavy operation. Further, you could have re-entrance problems if you work with DB2-static SQL. The second option requires a little more coding but allows an optimization.

A single instance of **FsServ** is created by the main **FinSin** object the first time it is opened. The DB2 connection is made the first time the server object is accessed. Whenever a transaction is over, a thread is started to monitor system activity, and if no other transaction is started in a fixed time (such as five minutes), **FinSin** disconnects from the database. This strategy saves network resources, especially when the system is heavily loaded by many clients.

Each time a **FinSin** WPS object needs to access a **FsServ** function, it has to follow the procedure shown in Listing 2. First, the main **FinSin** object is searched in the desktop. Then, a mutex semaphore is wed to avoid multiple concurrent server access, and the **getServer** method of **FsWpMain** is called, using name resolution, to eventually

get a pointer to the server object. After the operation has been completed, the semaphore must be released by the calling object. The `getServer` and `releaseServer` functions are added to a global library linked by all FinSin WPS objects. The code for `releaseServer` is similar to Listing 2's code for `getServer`.

The deals, the account folders, and the instrument folders present on the desktop need to remain unchanged across system reboots, so they inherit from `WPFolder` and save their instance variables using the `wpSaveState` and `wpRestoreState` methods.

On the other hand, there are hundreds of instruments and accounts, some of them needed on the desktop only for the time of a deal execution or a price update. These objects have their permanent representation as rows in the DB2 tables. In the WPS they are created as instances of classes inheriting from `WPTransient` and deleted when they aren't needed any more.

This makes instrument and account folders population a delicate issue. You have to refresh the content each time the folder is opened, as some other user could have changed the database since the last update of the folder content.

Overriding the `wpPopulate` method ensures synchronization between multiple views of the same folder and handles the "refresh" menu item request. Listing 3 shows the `wpPopulate` code of the account folder class.

`getNextAccount` is the `FsServ` method that handles the DB cursor operations. The added objects are tagged so that

they aren't deleted by the following loop, which deletes all objects not being created during the population in progress.

Conclusion

As a software developer, I now have techniques I can easily reuse in other applications. Change the financial instruments with medical examinations, the account with the patient record, and the deal with the progress of the patient contact in a health-care structure, and you've done a medical application. I'm sure you can find a lot of analogies like this.

The Workplace Shell's OOUI is a bigger step forward than GUI was years ago, and it can be a valuable tool for successful software development.

References

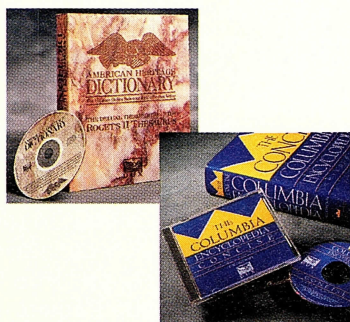
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Campagnoni, F.R.. "Distributed Objects: Application Design Tips." *OS/2 Developer*, July/August 1995.

SOMObjects 2.1 User's manual, shipped with the product.

Fabrizio Aversa is president of Sinapsi System Integration, a software development company based in Rome, Italy. He has been involved in OS/2 programming since 1989. He has a degree in physics and worked in high-energy physics till 1990. He can be reached via the Internet at faversa@mbox.vol.it.

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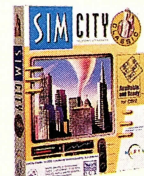
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Making REXX Look Pretty

BY DICK GORAN



There are many reasons for being able to format data in a particular way. I won't attempt to rationalize the need vs. style arguments for formatted data. Let it suffice to say that the requirement exists for formatting alphabetic and numeric data, each for its own reason.

Your *config.sys* file is a good example of a file that contains data that is difficult to read, because it probably contains lines that are wider than the width your editor can display without your having to scroll the lines left and right. More than likely, the *LIBPATH=* line and the *HELP=* line contain many more characters that you can see at one time with your editor. If the number of characters exceeds your editor's width by just a few characters, scrolling back and forth is quite easy. However, if your system is growing, you may have a *HELP=* line that con-

tains over 200 characters. Aligning the tokens from each long line, shown in Figure 1, makes it much easier to see the relative position of the tokens.

Listing 1 contains a program (*9601ls01.cmd*) that will create a *config.txt* file from your *config.sys* file (in the root directory of your OS/2 system drive). This program will format all of the *config.sys* lines that exceed 76 characters into the format shown in Figure 1. This program, as well as the other programs shown in this column, can be downloaded from Library 2 of the OS2AVEN forum on CompuServe. They can also be FTPed from <ftp://ftp.cfsrex.com/pub>. The sequence numbers at the end of each line are not necessary and are included here for convenient reference.

Lines 01 to 18 are housekeeping and initialization. The meat of the program is contained in lines 24 to 62

with the actual formatting occurring in lines 38 to 61. The technique used is to capture the number of positions occupied up to, and including, the equal sign. This value creates the leading portion of each subsequent line in order to align each of the semicolon-terminated tokens.

A further enhancement to this program could add the time stamp of every file and directory referenced in *config.sys* as a prefix to each line. The resulting program is too large to include within this column; however, I have uploaded it as *listcfg.zip* to the two locations noted above. In the event that a file or directory is referenced in *config.sys* that does not exist, the time stamp is replaced with a ? for files and 00/00/00 for directories.

These two examples are very simplistic and don't really take advantage

REXX Column, cont'd on p. 52

Figure 1: Help= line.

```
SET HELP=c:\os2addon;
  E:\MMOS2\HELP;
  E:\OS2\HELP;
  E:\OS2\HELP\TUTORIAL;
  E:\VIEWER\HELP;
  J:\DEVTECH;
  J:\READIBM2;
  K:\VISPRORX;
  L:\TCPIP\HELP;
  L:\TCPIP\UMAIL;
  M:\WWW\BIN;
  P:\IBMP\HELP;
  P:\IBMP\ID\HELP;
  P:\PLITK\HLP;
  P:\VXODK\BOOKS;
  P:\VXREXX;
  P:\WATCOM\BIN\HELP;
```

Figure 2: HELP= line with time stamp.

```
94/08/27 07:59p SET HELP=c:\os2addon;
95/01/17 10:15p   E:\MMOS2\HELP;
95/01/17 10:07p   E:\OS2\HELP;
95/01/17 10:07p   E:\OS2\HELP\TUTORIAL;
95/03/21 07:15a   E:\VIEWER\HELP;
94/08/31 09:57p   J:\DEVTECH;
94/04/07 01:11p   J:\READIBM2;
95/03/25 04:51p   K:\VISPRORX;
95/07/04 02:20a   L:\TCPIP\HELP;
95/07/04 02:21a   L:\TCPIP\UMAIL;
?           M:\WWW\BIN;
95/03/26 12:39p   P:\IBMP\HELP;
95/09/13 09:10p   P:\IBMP\ID\HELP;
95/03/26 12:35p   P:\PLITK\HLP;
95/03/26 03:23p   P:\VXODK\BOOKS;
95/03/26 02:42p   P:\VXREXX;
95/03/29 07:51p   P:\WATCOM\BIN\HELP;
```


Listing 1: 9601ls01.cmd.

```

/* 9601LS01.CMD - Create CONFIG.TXT from CONFIG.SYS */
call RxFuncAdd 'SysLoadFuncs', 'REXXUTIL', 'SysLoadFuncs'

GBL = '' /* initialize stem */
GBL.environment =,
'OS2ENVIRONMENT'
GBL.boot_drive =,
LEFT( VALUE( 'RUNWORKPLACE',, GBL.environment ), 2 )
GBL.width = 76 /* limit for nbr of characters / line */

GBL.input_file =,
GBL.boot_drive ||,
'\config.sys'
GBL.output_file =,
GBL.boot_drive ||,
'\config.txt'
call SysFileDelete GBL.output_file /*erase existing file */

/*-----*\
| Read each line of CONFIG.SYS |
| & list according to size |
\*-----*/
do while LINES( GBL.input_file ) > 0
input_line = LINEIN( GBL.input_file )
if LENGTH( input_line ) <= GBL.width then
do
/*-----*\
| Echo short lines |
\*-----*/
call LINEOUT GBL.output_file, input_line
iterate
end
/*-----*\
| Calculate number of leading |
| blanks for continuation lines |
\*-----*/
continuation_line_blank_count =,
POS( '=', input_line )
/*-----*\
| Process 1st of ? lines |
\*-----*/
parse value input_line with,
output_line,
';',
after_semicolon
call LINEOUT GBL.output_file, output_line || ';'
/*-----*\
| Process all remaining tokens, |
| one per line |
\*-----*/
do while after_semicolon <> ''
parse value after_semicolon with,
token,
';',

```

cont'd on p. 52

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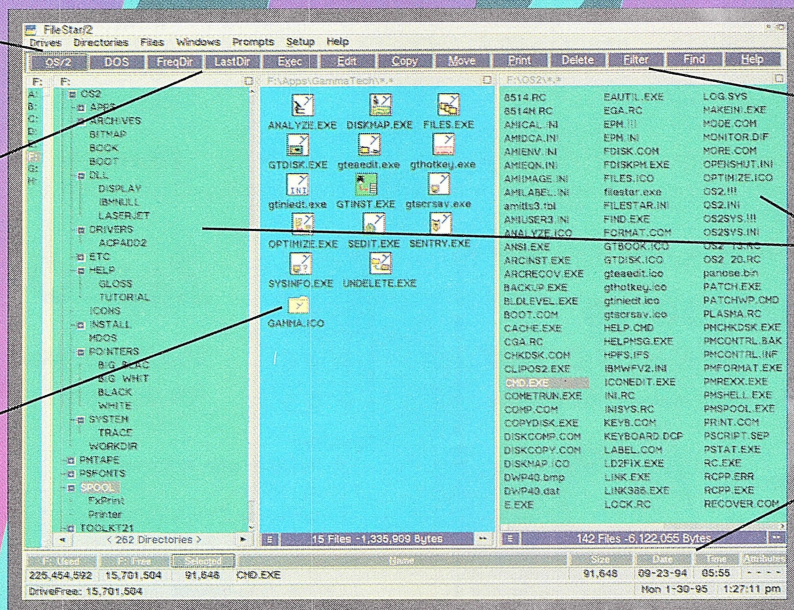
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Listing 1: Con't from page 50.

```

    after_semicolon                                     /*56*/
output_line =,                                         /*57*/
    COPIES( ' ', continuation_line_blank_count ) ||,  /*58*/
    token || ';'                                       /*59*/
    call LINEOUT GBL.output_file, output_line         /*60*/
end                                                    /*61*/
end                                                    /*62*/
call STREAM GBL.input_file, 'C', 'CLOSE'             /*63*/
call STREAM GBL.output_file, 'C', 'CLOSE'           /*64*/
exit                                                  /*65*/

```

REXX Column, cont'd from p. 49

of the formatting facilities in REXX, but they can be used as a reference for further examples.

Columns

Presenting column data is facilitated by the LEFT() and RIGHT() built-in REXX functions, which allow a string to be returned at the beginning or the end of a specified string length and with a padding character, if necessary. Because REXX strings, which exclu-

sively contain numeric characters, are presented without leading zeroes, using the RIGHT() function with both a length and a padding character can be used to force a string to be presented with leading zeroes. For example:

```

new_field =,
    RIGHT( 123, 5, '0' )

```

will assign the string '00123' to the variable new_field. If the resulting value was to be placed in a column fol-

lowed by two blanks,

```

column_data =,
    LEFT( new_field, 7 )

```

would result in a 7-character string being assigned to the variable column_data, which would contain '00123_ '(_ is used here to indicate a blank space).

Numeric values

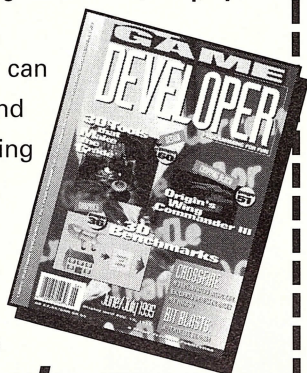
The FORMAT() built-in function is

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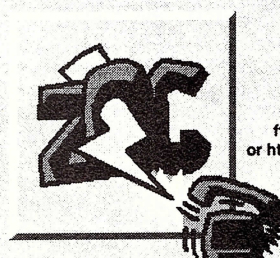
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Figure 3: FORMAT() examples.

```
/* */
number = 123.45
/* 1 */ say FORMAT( number, 3, 0 ) 123
/* 2 */ say FORMAT( number, 3, 1 ) 123.5
/* 3 */ say FORMAT( number, 3, 2 ) 123.45
/* 4 */ say FORMAT( number, 3, 3 ) 123.45
/* 5 */ say FORMAT( number, 2, 3 ) 0ops!
```

used for rounding a string containing a decimal value, specifying the number of integer characters to be used (the digits to the left of the decimal point) along with the number of characters to the right of the decimal point that will be returned. Figure 3 shows a comparison of using the FORMAT() function to vary the style of a numeric value's representation.

Note that the fifth SAY instruction results in the following error:

```
7 +++ Say FORMAT(number, 2, 3);
REX0040: Error 40 running
H:\OS2-MAG\9601FG03.CMD,
line 7: Incorrect call to
routine
```

because the number of digits to the left of the decimal point in *number* exceeds the number of places indicated in FORMAT(*number*, 2, 3). The number of integer digits in the value you try to format with the FORMAT() function must not exceed the number of positions specified as the second, optional parameter to the FORMAT() function. If the second parameter is omitted, the value is displayed without leading zeroes, unless the number is less than 1.0, in which case one zero will precede the decimal point. The FORMAT() function also results in the returned value being rounded at one greater than the number of decimal positions specified. Hence, in the second SAY example in Figure 3 the value returned is rounded at the second decimal digit.

In summary, you can present data in a comfortable, readable format with REXX without very much effort. As with all data formatting, a little careful thought and planning will save you a considerable amount of effort.

Dick Goran is the author of the REXX Reference Summary Handbook. He has been in the computer industry since 1961 and was in the IBM mainframe systems software development business until 1987. He teaches OS/2 REXX to corporate clients and lectures on OS/2. His free REXX utility programs can be downloaded from OS2DF1, lib 6 on CompuServe or from ftp.cfsrex.com/pub. He can be reached at 71154.2002@compuserve.com.

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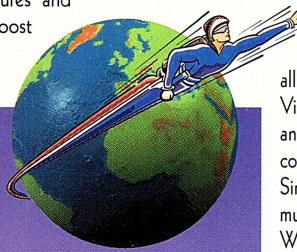
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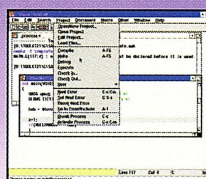
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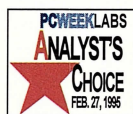


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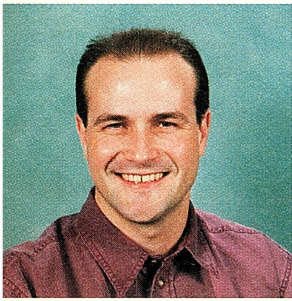


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A ROP in the Park

BY MARK BENGÉ and MATT SMITH

In the November/December 1995 issue of *OS/2 Developer*, we discussed the display of bitmaps. We will continue our discussion, this time dealing with an issue that has confused many of us: ROPs (Raster-Operations).

Yet another quick history lesson

To be able to understand ROPs, we first have to understand their use. Bit-boundary block transfers (bit-blts) are the graphics areas that use the ROP. ROPs provide bitwise operations on a rectangular area, which at first were one bit per pixel refresh buffers.

The key here is the bitwise operation. If you keep this in mind, you will easily understand what ROPs are supposed to do.

In conjunction with this, let's take a brief look at the Bit-blt operation to better understand the ROP usage. The Bit-blt operation copies a source array into a destination array, where the two are combined according to the ROP code. The AND operation uses the source array as a mask to selectively clear parts of the destination array. The OR operation

uses the source array, again as a mask, to selectively set parts of the destination array.

A good example of the OR operation is when a font character is drawn. The bits of the character are OR'ed with the destination, causing the character to be shown without distorting the background.

The XOR operation is used to invert the destination array. These operations, AND, OR, and XOR, along with NOT, are used to create the basis of the ROP.

To the initial scope of the source and destination array, patterns have been added. These three constitute the ROPs we see today.

Part of the confusion is that many programmers misconstrue that the ROP is used as the binary operation, which is not the case. The ROP function is very similar to that of an assembler opcode. Basically, it is used to denote the binary operations that are to be performed.

The ROP code

Now, we will jump into the hazy part: the actual ROP codes. A ROP code is

composed of operands and operations. There are three defined operands: Destination, Pattern, and Source and four defined operations: bitwise AND, bitwise NOT, bitwise OR, and bitwise exclusive OR (XOR).

The ROP code is a Boolean operation in which the pixels of the source, pattern, and destination are combined. You will see within the OS/2 documentation the definitions for the operands:

10101010	Destination
11110000	Pattern
11001100	Source

These values are then combined using the Boolean operators to form the final ROP code. The easiest way to understand the final ROP code is to denote it as Reverse Polish Notation (those with HP calculators will easily understand this).

A simple example

The ROP code ROP_NOTSRCERASE in Reverse Polish Notation is:

DSON

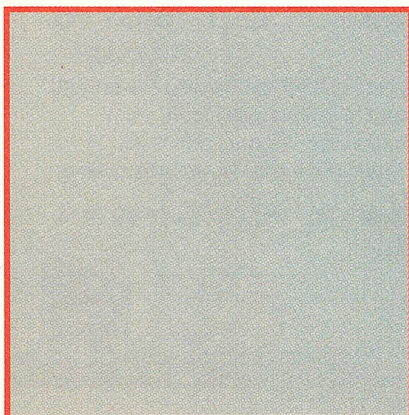


Figure 1: Destination.

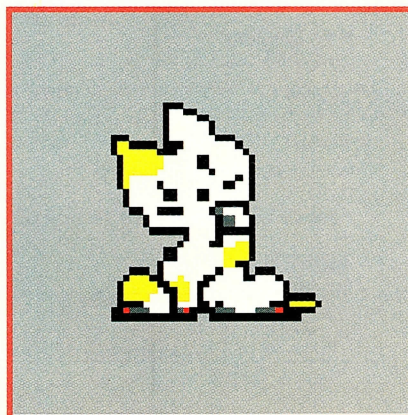


Figure 2: Source bitmap.



Figure 3: Destination OR source.

Let's apply the ROP code, **ROP_NOTSRCERASE** to the image in Figure 2 and see what happens to the final image. First, the destination, which is shown in Figure 1.

Yes, it is just a gray background, but, this is important since it is the destination. The source, Figure 2, is the bitmap.

Now, the fun begins. The first operation is:

Destination OR Source

This result can be seen in Figure 3.

The last operation is:

NOT (Destination OR Source)

and can be seen in Figure 4.

What happens here is the destination, Figure 1, is **OR**'ed with the source, Figure 2. In essence, the pixels of each are **OR**'ed together. Then,

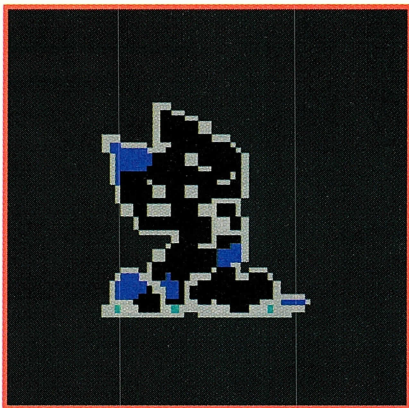


Figure 4: NOT (destination OR source).

the result of that operation, Figure 3, is **NOT**'ed. In other words, each pixel is **NOT**'ed.

There, it's that simple. Well, okay, maybe not that simple.

Confusion abounds

Next question: where and when should we use a particular ROP? Table 1 shows all the ROP codes with the Reverse Polish Notation and common PM names where PM definitions exist. There are only 255 ROP codes, with each one having a particular meaning, hence, purpose. Why 255? Remember, the operands only had eight bits, therefore, only 255 possible values.

Depending on the documentation you read, you may get the distinct impression that the destination must be a bitmap. Not necessarily: The destination could be a memory presentation space (PS) that is a bitmap, or, it could be an area of a window or dia-

logue. It's important to know the destination's contents before the first raster operation is performed. This is where a lot of the power of the ROP codes comes from.

Pattern operands are also often poorly documented. What is the pattern? Well, quite simply, it's the pattern set defined for the PS. By default it is solid. Have you ever wondered how to create the disabled buttons? Set the pattern to a half-tone using **GpiSetPattern(hPS, PATSYM_DENSE8)**. Then draw the bitmap with ROP code **0xC8**.

Figure 5 is an example of the bitmap drawn with a hatched pattern selected.

The ROP viewer

One of the best ways to understand ROP codes is to see them all in action. Using the bitmap viewer from our previous column as the starting point, we

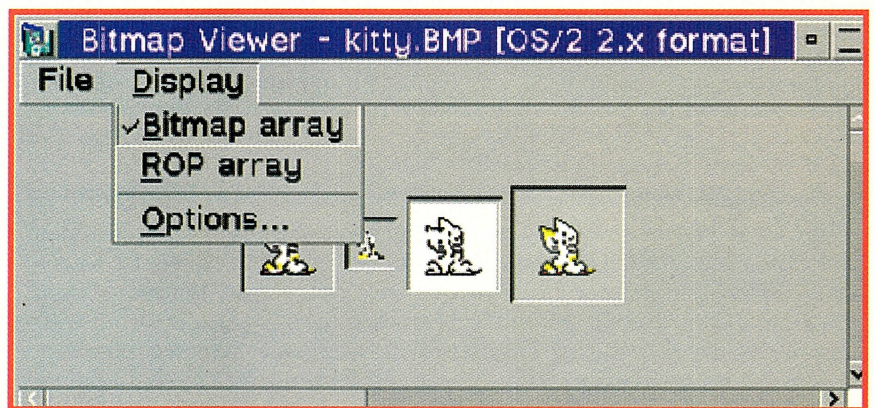


Figure 6: ROP viewer.

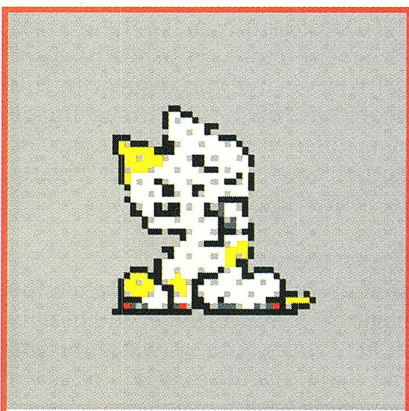


Figure 5: Bitmap with pattern.

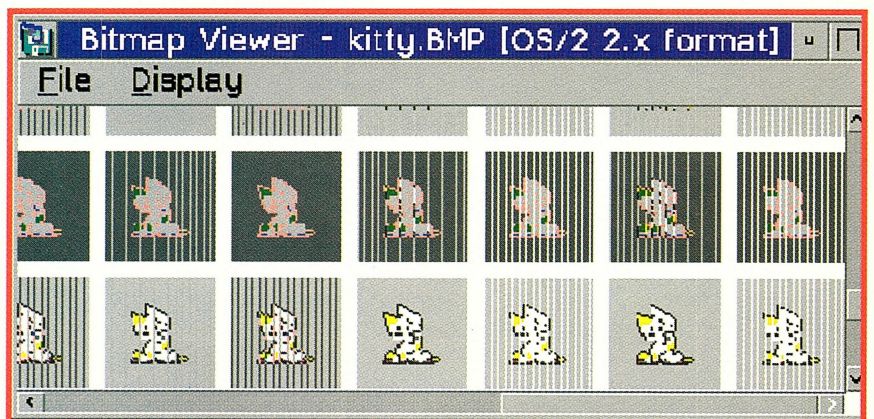


Figure 7: ROP viewer showing ROP array.

built a ROP viewer that would show all 255 ROP codes at once with a selected bitmap. An important aspect of this viewer is to allow the setting of the destination color and the pattern set. Even so, this only scratches the surface of how we use ROP codes.

The viewer initially shows the bitmap selected (Figure 6).

When you select the ROP array menu item in the Display menu, it then displays the full ROP array, like that in Figure 7.

Each row shows 16 images, and there are 16 rows. Starting from the top left corner of the window, this is ROP 00. You'll notice that the ROP codes increase in value moving left to right and downwards.

If you click the right mouse button when the mouse pointer is over an image, the View ROP dialogue will be displayed (Figure 8).

The View ROP dialogue allows you to see the actual construction of the final image step by step. A series of buttons is labeled 1 through 7. Each one represents the image for that particular step. To the left of the buttons is displayed the Reverse Polish Notation for the step.

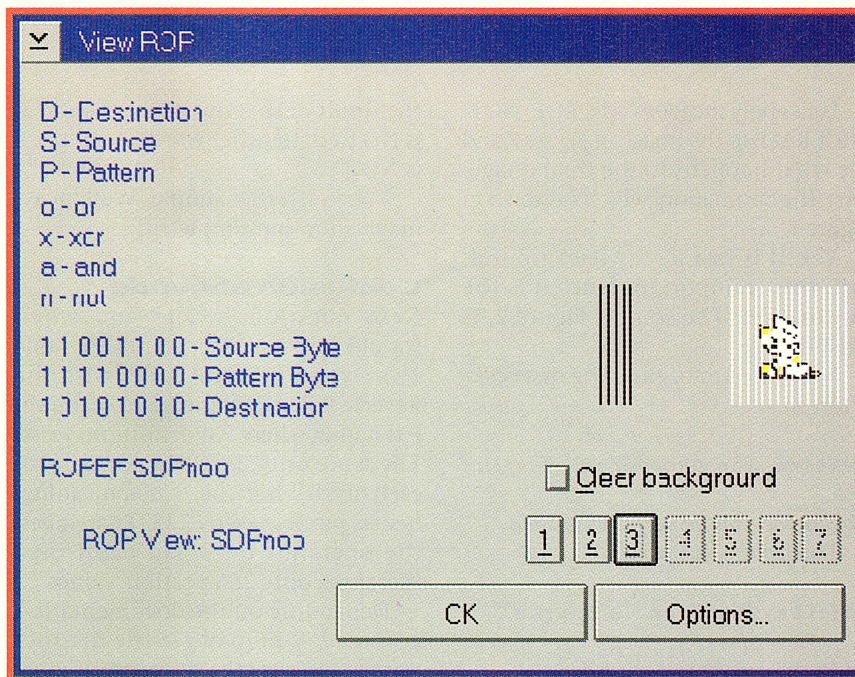


Figure 8: View ROP dialogue.

The image for the step is displayed above the buttons. And, just to the left of the bitmap image you'll see the current pattern set.

Through the Options... push but-

ton, the Options dialogue allows you to select the background color and the pattern to use. This allows you to experiment with the bitmap image, background (destination) color, and the ROP.

Errata

Oops, we goofed in some of the information we presented concerning bitmap colors on pages 14 and 15 of the article in the November/December 1995 issue of *OS/2 Developer*. Some of the information was not properly transposed from the sample code, which is correct, to the article text. Our apologies for any confusion this may have caused. The necessary revisions are presented below.

The following table depicts the number of colors as defined by cBitCount on page 14:

cBitCount	Colors
1	2
4	16
8	256
24	16.7-M

(The last entry was mistakenly listed as 16 and 65,536.)

The paragraph and calculation that immediately follows the cBitCount/colors table on page 14 should read as follows:

The easiest way to determine the number of colors is to take the value of 1 and rotate it left cBitCount positions:

```
cColors = 1 << bfh2.bmp2.cBitCount
```

Anywhere we mention 64-K color bitmap(s) or 64-K bitmap on pages 14 and 15 is in error as well. The 64-K should be 16.7-M (million).

Okay wiseguys, where do I...

Now that we know how to use ROP codes, where in blazes do we use them? One place is in icons. Another place to use them is in a tool bar where you want to store only one bitmap image within an application's resources. However, you want the image to have three or four different display types, such as disabled, up, down, and selected positions.

To successfully make these work, we have to move on to the usage of ROP codes in multiple sequences. This means drawing the bitmap image using different ROP codes in a specific sequence, which in the end, creates the desired effect.

Next month

Next month we will experience the magic of icons, which depend heavily on ROP codes. And we will show you how you use the ROP codes in sequences with a bitmap to create a desired effect.

Table 1: Raster OP codes.

D Destination
S Source
P Pattern
n Logical NOT
o Logical OR
a Logical AND
x Exclusive OR (XOR)

ROP RPN (name)

00 0 (ROP_ZERO)
01 DPSoon
02 DPSONa
03 PSON
04 SDPona
05 DPon
06 PDSxnon
07 PDSaon
08 SDPnaa
09 PDSxon
0A DPna
0B PSDnaon
0C SPna
0D PDSnaon
0E PDSonon
0F Pn
10 PDSona
11 DSON (ROP_NOTSRCERASE)
12 SDPxnon
13 SDPaon
14 DPSxnon
15 DPSONa
16 PSDPSanaxx
17 SSPxDSxaxn
18 SPxPDxa
19 SDPSanaxn
1A PDSPPaon
1B SDPSxaxn
1C PSDPaon
1D DSPDXaxn
1E PDSox
1F PDSaon
20 DPSONa
21 SDPxon
22 DSna
23 SPDnaon
24 SPxDSxa

ROP RPN (name)

25 PDSPanaxn
26 SDPSaon
27 SDPSxnox
28 DPSONa
29 PSDPSaonxn
2A DPSONa
2B SSPxPDxaxn
2C SDPSaon
2D PSDnox
2E PSDPxox
2F PSDnaon
30 PSna
31 SDPnaon
32 SDPSoon
33 Sn (ROP_NOTSRCOPY)
34 SDPSaon
35 SDPSxnox
36 SDPox
37 SDPaon
38 PSDPPaon
39 SPDnox
3A SDPSxox
3B SPDnaon
3C PSx
3D SDPSonox
3E SDPSnaon
3F PSan
40 PSDnaa
41 DPSONa
42 SDxPDxa
43 SDPSanaxn
44 Sdna (ROP_SRCERASE)
45 DPSONa
46 DSPDaon
47 PSDPxaxn
48 SDPxa
49 PDSPDaonxn
4A DPSONa
4B PDSnox
4C SDPna
4D SSPxDSxoxn
4E PDSPxox
4F PDSnaon
50 PDna
51 DSPnaon

ROP RPN (name)

52 DPSONa
53 SDPSxaxn
54 DPSONa
55 Dn (ROP_DSTINVERT)
56 DPSONa
57 DPSONa
58 PDSPaon
59 DPSONa
5A DPx (ROP_PATINVERT)
5B DPSONa
5C DPSONa
5D DPSONa
5E DPSONa
5F DPan
60 PDSxa
61 DSPDSaonxn
62 DSPDaon
63 SDPnox
64 SDPSaon
65 DPSONa
66 DSx (ROP_SRCINVERT)
67 SDPSonox
68 DSPDSonoxn
69 PDSxxn
6A DPSONa
6B PSDPSaonxn
6C SDPaon
6D PDSPDaonxn
6E SDPSnaon
6F PDSxnan
70 PDSna
71 SSDxPDxaxn
72 SDPSxox
73 SDPnaon
74 DSPDXox
75 DPSONa
76 SDPSnaon
77 DSna
78 PDSax
79 DSPDSaonxn
7A DPSONa
7B SDPxnan
7C SDPSnaon
7D DPSONa
7E SPxDSxo

cont'd on p. 58

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Matt Smith, Prominare Inc., Toronto, Ont., is lead architect for the Prominare Development System, an OS/2 2.x

advanced GUI development environment. Matt has been actively involved with OS/2 since 1988 and cofounded Prominare in 1990. He has a degree in architecture from the University of Waterloo and can be reached on CompuServe at 70363,1175 or via the Internet at msmith@prominare.com.

Table 1: Con't from p. 57.

ROP RPN (name)

7F DPSaan
 80 DPSaa
 81 SPxDSxon
 82 DPSxna
 83 SPDSnoaxn
 84 SDPxna
 85 PDSPhoaxn
 86 DSPDSoaxx
 87 PDSaxn
 88 DSa (ROP_SRCAND)
 89 SDPSnaoxn
 8A DSPnoa
 8B DSPDxoxn
 8C SDPhoa
 8D SDPSxoxn
 8E SSDxPDxax
 8F PDSanan
 90 PDSxna
 91 SDPSnoaxn
 92 DSPDPoaxx
 93 SPDaxn
 94 PSDPSoaxx
 95 DPSaxn
 96 DPSxx
 97 PSDPSonoxx
 98 SDPSonoxn
 99 DSxn
 9A DPSnax
 9B SDPSoaxn
 9C SPDnax
 9D DSPDoaxn
 9E DSPDSoaxx
 9F PDSxan
 A0 DPa
 A1 PDSPhoaxn
 A2 DPSnoa
 A3 DPSDxoxn
 A4 PDSPhonoxn
 A5 PDxn
 A6 DSPnax
 A7 PDSPhoaxn
 A8 DPSoa
 A9 DPSoxn
 AA D
 AB DPSono

ROP RPN (name)

AC SPDSxax
 AD DPSDaoxn
 AE DSPnao
 AF DPno
 B0 PDSnoa
 B1 PDSPhoxn
 B2 SSPxDSxox
 B3 SDPhan
 B4 PSDnax
 B5 DPSDdoxn
 B6 DPSDPaoxx
 B7 SDPxan
 B8 PSDPxax
 B9 DSPDaoxn
 BA DPSnao
 BB Dsno (ROP_MERGEPAINT)
 BC SPDSanax
 BD SDxPDxan
 BE DPSxo
 BF DPSano
 C0 Psa (ROP_MERGECOPY)
 C1 SPDSnaoxn
 C2 SPDSonoxn
 C3 PSxn
 C4 SPDnoa
 C5 SPDSxoxn
 C6 SDPhax
 C7 PSDPhoaxn
 C8 SDPha
 C9 SPDoxn
 CA DSPDxax
 CB SPDSaoxn
 CC S (ROP_SRCCOPY)
 CD SDPhono
 CE SDPhao
 CF SPno
 D0 PSDnoa
 D1 PSDPhoxn
 D2 PDSnax
 D3 SPDSoaxn
 D4 SSPxPDxax
 D5 DPSanan
 D6 PSDPSaoxx
 D7 DPSxan
 D8 PSDSPxax

ROP RPN (name)

D9 SDPSaoxn
 DA DPSDanax
 DB SPxDSxon
 DC SPDnao
 DD SDno
 DE SDPho
 DF SDPhano
 E0 PDSoa
 E1 PDSoxn
 E2 DSPDxax
 E3 PSDPhoaxn
 E4 SDPSxax
 E5 PDSPhoaxn
 E6 SDPSanax
 E7 SPxPDxan
 E8 SSPxDSxax
 E9 DSPDSoanaxn
 EA DPSao
 EB DPSxno
 EC SDPho
 ED SDPhono
 EE DSa (ROP_SRCPAINT)
 EF SDPhono
 F0 P (ROP_PATCOPY)
 F1 PDSono
 F2 PDSnao
 F3 PSno
 F4 PSDnao
 F5 PDno
 F6 PDSxo
 F7 PDSano
 F8 PDSao
 F9 PDSxno
 FA DPo
 FB DPSnoo (ROP_PATPAINT)
 FC PSo
 FD PSDnoo
 FE DPSoo
 FF 1 (ROP_ONE)

Credits:

Special thanks to Michael Cooper for providing insight into ROP codes.

You can download *bmp2.exe* from these electronic sources:

CompuServe's OS2AVEN (OS/2 Magazine Section).

File area 11 on the IBM PCC BBS, (919) 517-0001, OS/2 Tools section on the

OS/2 BBS for IBM TALKLink customers. You can also FTP to the site address *prominare.com* and log in as *anonymous*. The source is located in the */pub/prominare/guicornercodecache* subdirectory. Also check out the new GUI Corner home page at www.prominare.com/prominare/guicorner.html.

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Communicating by Phone and Mail

BY BRIAN PROFFITT

HyperAccess 6.0

Because HyperAccess Lite is included in the OS/2 Warp BonusPak, many people have wondered why they should bother purchasing any other ASCII (non-3270) terminal emulation software. Hilgraeve tries to answer that question with a new release of its full version of HyperAccess (HA).

All new user interface

If you're using HyperAccess/5 now, be prepared for a significantly snazzier user interface. HyperAccess 6.0 is a graphical application, which includes a visual indication of the front-panel lights of your modem. The interface is extremely customizable; in fact, for each entry in your phone book, you can choose what functions you want on the button bar, coinciding with the tasks you most frequently use with that service! You can select from existing

button/commands or define your own commands and label buttons with text or icons. The program also allows keystroke macros (unique for each phone book entry), menu commands, or external programs to be run when those buttons are clicked. Other Workplace Shell support includes use of the right mouse button to get pop up menus of HA objects, drag and drop, and support for long file names.

Those interested in fastest communication throughput usually assume that graphical packages aren't going to reach the same speeds as their character-based counterparts. HA averaged between 975 characters per second (cps) and 1,100 cps downloading a file of 421,327 bytes from CompuServe using the Quick-B protocol. This was using a Hayes Optima 144 modem on a buffered serial port on the motherboard, rather than an adapter card, and

then connected to CompuServe at 57,600 bits per second (bps). The average of around 1,015 cps is fine for a graphical communication program, but not breathtaking.

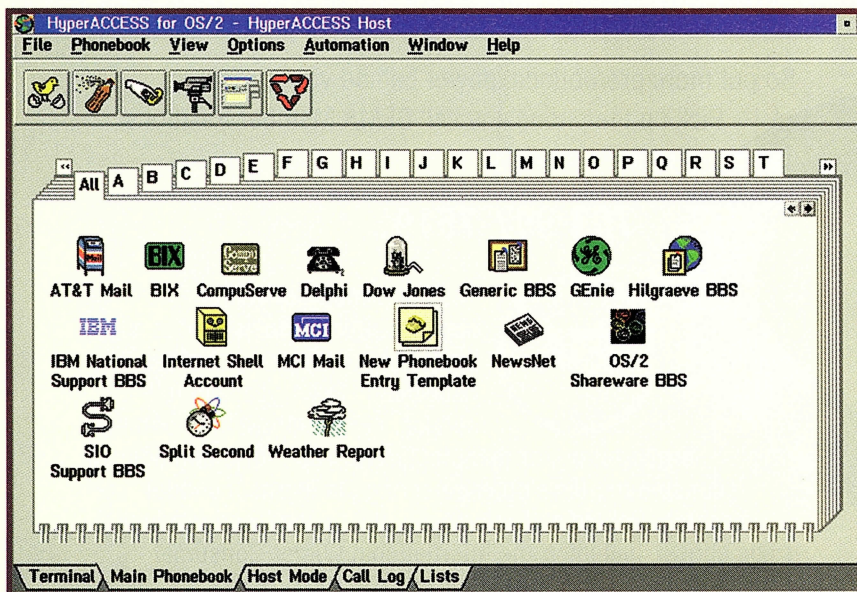
This is a 32-bit OS/2 package, but because communications software uses so much of the CPU, I found that the speed dropped down below 750 cps when I did the same download while actively typing in a Win-OS/2 session. That's a little more degradation than I would have liked on a 16MB Pentium-90 system.

Hilgraeve packaged the SIO communications device driver with HA. SIO replaces the asynchronous communications drivers included with OS/2. I strongly suggest that you try the SIO driver. It raises your top connection speed from 57,600 bps to 115,200 bps. It also speeds up communication to the point that you can realistically consider connecting at those speeds. In fact, all timings mentioned in this review were done with the SIO driver in use. Note, though, that the version of SIO in HyperAccess is an unregistered copy of the shareware product. As with all shareware, you are expected to register it if you plan to continue using it.

Using the phone book

Host systems that you plan to call are organized into a phone book. HA gets you started with more than a dozen entries already in the phone book. A conversion program is included so those using HyperAccess Lite or the earlier HA/5 can import their phone book to this new version.

Hilgraeve also includes exhaustive lists of bulletin board sites (including more than 300 dedicated to OS/2),



making it more possible to find a BBS in your area where you can get online fast. Phone numbers and logon scripts are also included for such handy things as automatic connection to the U.S. Government service, which provides the precise time according to the official U.S. atomic clock. The script changes your computer's time to the exact time detected (with allowance for differing time zones).

By the way, it may seem like a small touch, but I appreciate the company's inclusion of a generic BBS entry in the phone book. This lets you handle those one-time calls that you'd otherwise have to add to your phone book or dial by typing modem commands. Simply answer the prompt for the phone number, and the call is made. A feature that Hilgraeve calls CommSense works to detect the correct settings for data bits, parity, and stop bits of these new host systems automatically.

HA includes a recorder that can watch the interaction as you start a connection with a service and go through the logon process. The program then generates a REXX script to automate those steps. You can attach that script to the phone book entry so it automatically runs when you call the service to automate the logon. This same technique applies to any series of interactions that you might want to store and replay.

Speaking of REXX, you can write your own communication scripts using the HA Application Programming Interface. More than 100 functions are included to provide power for communication programs as complex as any you might need.

Other goodies

However, you aren't limited to being the caller of host services. HA includes a host mode that allows you to accept calls from other computer users. This isn't a complete BBS, but it does allow others to examine your disk, upload and download files, and even execute some limited disk management commands. Naturally, this is all secured, and you can instruct HA only to connect with those whose names and passwords you provide in advance, to connect but ask new users to provide names and passwords, or to accept all calls. You can also define which of

these privileges will be allowed for specific and general new users. For greater security, you can instruct HA to immediately hang up after a successful logon and then call the user back at a specified number to make sure only the designated computer is being used.

When calling other systems, it is quite common to download graphics images from those services. HyperViewer, an included display program for graphics files, includes support for all the major formats, including *.gif*, *.tiff*, *.bmp*, and *.pcx*. The documentation plays up the program's ability to automatically display *.gif* images as they are downloaded so you can cancel a transfer if you decide you don't like the image. That's great in theory, but there aren't many places where you download *.gif* files uncompressed. Nearly all online services use a facility such as *pkzip* to save space on their own system. HyperViewer can't extract the compressed images during download. Still, it is handy for viewing images once they've been decompressed.

Those in an enterprise will appreciate that HA has provisions for installation across a network, as well as for direct cable attachment and modem pools. If you have modems on separate comm ports, you can simultaneously run multiple instances of HA. You can also get telnet access to the Internet via TCP/IP.

The Message Pad is a small editor for composing messages and responses. Especially if you're in chat mode, this is a convenient way of getting your message just right before sending it off to the host. When composing those messages, you can refer to the Backscroll buffer. HA keeps separate session buffers for each phone book entry, so you can call several services in a row without losing information still in the buffer from earlier sessions. You can save time online (and therefore money) by pulling down all e-mail, hanging up, and then scanning back through the buffer to read the mail offline.

The documentation is good, and I like the concept of having an early chapter for OS/2 novices that provides some basics of negotiating the icons, menus, windows, and notebooks of the HA interface. Also, a quick look at the OS/2 Enhanced Editor is provided for those who will be writing REXX scripts.

Hilgraeve has also added its own file

transfer protocol, HyperProtocol. Using HyperProtocol, I was successfully able to restart a file transfer that had been stopped before completion. This function can save a great deal of time and money, but only if you're communicating with another system that understands HyperProtocol.

Finally, I can't let it go unnoticed that Hilgraeve was gracious enough to provide an uninstall program. Not that anyone ever plans to use it, of course, but I certainly appreciate its presence.

Glee or flee

If you access multiple online services with different logon scripts, HyperAccess can save you much time and trouble. For that matter, even if you just spend a great deal of time in a single online session, the creation of customized macros and buttons can make life simpler. However, considering the shareware products available and the existence of HyperAccess Lite in the BonusPak, the suggested retail price is on the high side for those who don't use communications all that frequently or heavily.

Mailing Assistant 1.17

Anyone with a mailbox knows just how much marketing is conducted through the postal service. The reasons are simple: it's inexpensive and it works. Well, it's relatively inexpensive, but the recent 10% increase in rates didn't help. Mailing Assistant helps you save postage dollars by making it easy to take advantage of some of the discounts offered by the post office.

Postage discounts

The key to postage discounts is to do some of the post office's work for it. For example, simply sorting the mail into zip-code sequence is a good start. If you have more than ten 1-oz. letters going to the same 5-digit zip code, or 50 or more going to zip codes with the same first 3 digits, you can get reduced first-class postage of 27.4 cents each. The postal service requires that personal letters, bills, and statements of account be sent first class. On the other hand, if you're sending other printed materials, you can get further savings by sorting and sending them bulk mail, or third class. The regular bulk pre-sorted rate is

22.6 cents each, but if you have 125 pieces or more going to zip codes with the same first 3 digits, that drops further to 18.8 cents each. Not bad merely running a sort routine!

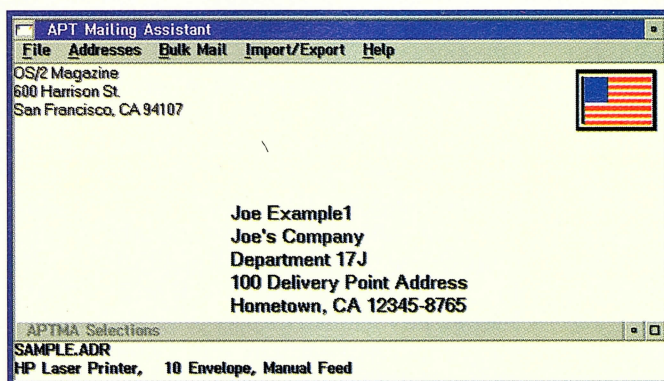
Of course, you also have to have the bulk rate mailing permit information on the items you send. Using a hand stamp on hundreds or thousands of envelopes isn't a picnic, and paying an outside company to print special envelopes with that information can get expensive. Mailing Assistant makes it easy to print envelopes or labels in zip-code sequence, and it can automatically print the bulk rate information on your envelopes as it prints the addresses.

POSTNET bar codes

You may have noticed that mail these days usually has a bar code at the bottom of the envelope. The postal service uses these to automate the sorting of mail and speed up handling. Your letters will almost certainly arrive more quickly if you put the bar codes on the envelope or address label ahead of time. This application avoids the delay of having postal-service employees perform this process manually to print the codes on each letter.

Printed bar codes can also save you money, if your mailing list has been certified by the post office's Coding and Accuracy Support System (CASS). Mailing Assistant can export your mailing list to disk in the format required for CASS certification. You send it off to the National Customer Support Center for the Postal Service. They verify the accuracy of the zip codes and make modifications as needed—particularly important because the extra four digits change occasionally as new buildings go up and routes change. The updated disk is returned along with a report on the data and a certificate about the addresses that passed.

When you print out your envelopes or labels, take the certificate along with the bar-coded ZIP-sorted mailing to the post office, and rates drop further. Depending on quantities to each zip code, first-class rates may drop to 25.8 cents each and third-class bulk rates to 16.6 cents each.



Some bad news

Mailing Assistant doesn't go through standard OS/2 channels for printing. Being ported from a DOS program, it creates the printer codes internally rather than letting the printer driver do it. Therefore, you need a LaserJet-, a DeskJet-, or an Epson-compatible printer. APT Solutions acknowledges the problem, and it plans to modify the program to use OS/2 techniques (and thus support all OS/2 printers) in a future release.

Also, Mailing Assistant has no provi-

sion for changing fonts. You're restricted to the plain Courier font that comes with every printer. You do have the option of printing the return address using the compressed version of that font, but I found that to be too small to be easily read. You are also unable to add anything graphical to the envelope. Most companies like to have their logo or some stylized rendering of the company name in the return address portion of the envelope, but Mailing Assistant has no graphic import ability.

The post office told me that they required a 1/8" white zone all around the bar code, and next Spring, they plan to become rigid in the enforcement of this rule. Mailing Assistant doesn't leave that much space between the last line of the address and the bar code. The post office also prefers the bar code to appear above the name of the recipient, which Mailing Assistant doesn't allow, but that isn't yet a firm rule.

Finally, this program is not a mailing-list manager. Mailing Assistant assumes you are using a regular database for that purpose. It imports the ASCII, comma-delimited addresses from your database to create its address files.

Glee or flee

If you're trying to get started in mass mailing, chances are good that Mailing Assistant will pay for itself the first time you use it. Even for small mailings, you get the extra handling security of the bar codes. You'll probably use labels more than envelopes, though, so you can continue to use your fancy logos. At least they offer a facility for re-using label sheets so you don't waste a whole page every time you print a single label!

Brian Proffit was part of IBM's OS/2 team and left IBM to become the director of PC Week's Corporate Labs. He is now the president of Visionary Research, senior contributing editor for OS/2 Magazine, and solutions advisor to PC Magazine. He can be reached via the Internet at 75300.1466@compuserve.com.

Resources:

HyperAccess 6.0 (\$129)

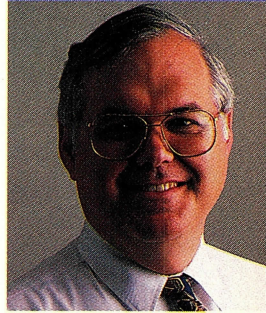
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Monroe, MI 48161
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(313) 243-0576
Fax: (313) 243-0645
BBS: (313) 243-5915
Internet home page:
<http://www.hilgraeve.com>
Internet e-mail: support@hilgraeve.com
CompuServe: GO HILGRAEVE (PCVENF), section 4
READER SERVICE NO. 100

Mailing Assistant 1.17 (\$37.95)

APT Computer Solutions Inc.
P.O. Box 47
Versailles, KY 40383-0047
606-873-0589
73023.3037@compuserve.com
READER SERVICE NO. 101

Making Network Connections for Real

BY WAYNE RASH, JR.



It wasn't very long ago, in fact it's only been about six months, since I asked an IBM product manager why his LAN Server client installation program didn't work with Microsoft's Windows for Workgroups. There was a pronounced silence on the line, then a bemused: "Why would we want it to?"

For some time now, users have faced confusion trying to make common products work in the world of IBM networking. It wasn't unusual to ask an IBM engineer about networking support and get answers that revolved around Systems Network Architecture.

Things have changed. In fact, they've changed so much that there's every reason to believe the competition that Microsoft has been expecting might actually be on the way. The competition won't be with Microsoft's strongly hyped Windows 95. Instead, it's looking like the real war will be with Windows NT over the struggle to control the application servers for tomorrow's heterogeneous networks.

Off to a weird start

Nearly a year ago, we began hearing about a new version of OS/2 Warp intended to support networking as a native capability. The new product, which would surface as OS/2 Warp Connect, included many things that Microsoft claimed were part of Windows 95. These capabilities included built-in Novell client software, TCP/IP, peer networking, automated installations, and crash-proofing. It was pretty much a grab bag that users had wanted for years, but had stopped hoping for.

At first, it didn't seem like IBM had delivered. The automated installation routines delivered with the OS/2 Warp

Connect beta, for the most part, didn't work. The built-in networking didn't connect with anything useful, such as Windows for Workgroups peers or Windows NT servers. It also wasn't crash-proof (although it was more crash resistant than Windows ever was). However, the TCP/IP worked as did the Novell NetWare client.

As time went on, OS/2 Warp Connect got better. By its release date, it was mostly working. Still, there were moments. For example, I was supposed to demonstrate OS/2 Warp Connect at a shoot-out during Spring Comdex, while *Windows Magazine* Editorial Director Fred Langa demonstrated Windows 95. At 2 a.m. on the day of the demonstration, I still had two IBM representatives in my hotel room trying to make OS/2 Warp Connect work on my laptop. I finally ended up borrowing their computer.

It got better

Somewhere along the way, things got better. I recently spent some time with the soon-to-be-released OS/2 Warp Server, and the differences were striking. Suddenly, OS/2 was on its way to becoming a seamless part of a heterogeneous network. You could plunk an OS/2 Warp-based computer down into just about any network, and it would happily sit there and interoperate while supporting database operations, e-mail, or groupware.

Actually, a number of important changes have recently occurred in OS/2 Warp. Most have gone unheralded, but they are there. Users who weathered the bad old days when it didn't all work will be delighted to see where it is now.

What's obviously changed the most is IBM's outlook as to their place in their

customers networks. In the past, the view was that the network was simply a path to the mainframe downstairs. Now, IBM still has unmatched support for mainframe computers in its network solutions, but the enterprise network as a whole has gained ground. Presently, companies with no mainframe at all can still find a solution in OS/2 networking.

What's been done

The most obvious change in the way IBM builds its software is when you start up OS/2 Warp. The installation process now works properly, even with difficult environments. For example, OS/2 Warp's installation program identifies both network interface cards and the proper settings for the cards, even when they don't match the default settings. The installer can now tell when it doesn't have support for a network card and can ask you for the disk containing the software it needs.

Once installed, OS/2 Warp has its communications more completely integrated. You no longer feel as if you're running a separate set of network requesters. Rather, once you start using OS/2 Warp, the network is just there. It appears when you need it, and the rest of the time, does its work out of sight.

Important new capabilities have been added, such as, a new network gateway service that lets users attached to an OS/2 Warp Server or a workstation with peer-sharing turned on access the visible network drives. You might, for example, have your copy of OS/2 Warp Server signed on to a Novell network. So, stations using the OS/2 Warp Server can also see and use the Novell network (assuming you'd turned on sharing, and

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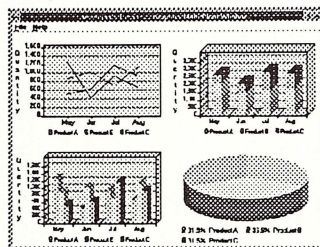
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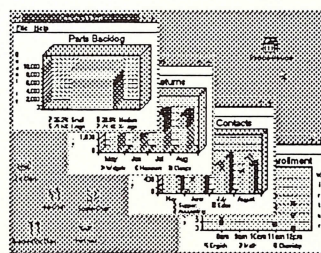
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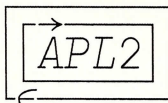
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Network Connection, *cont'd from p. 63*

they had the required rights). This network gateway service was once available only to users of Windows NT, but now OS/2 has picked up this capability.

More importantly, OS/2 Warp clients can now use Novell's NetWare Directory Service (something Windows NT can't do), which makes using a large enterprise network much more pleasant. In addition, IBM will introduce its own directory service with OS/2 Warp Server.

This emphasis on enterprise solutions has expanded OS/2 Warp's usefulness in a more traditional IBM domain—mainframes. OS/2 Warp Server ships with a new mainframe gateway service, which is supposed to make mainframe access from the network easier.

Doing Windows

It wasn't long ago that the idea of supporting Windows befuddled some at IBM—that's changed. Now, OS/2 Warp Connect and OS/2 Warp Server work just fine on networks supporting Net-BIOS, whether they're IBM or Microsoft servers. Even better, Microsoft clients

will be able to find an OS/2 Warp peer or server, now that IBM has made its browser compatible with Microsoft's.

Adding to its simplicity is new support for Windows 95, which will get a special dedicated OS/2 Warp Server client. Likewise, OS/2 Warp now supports multiple protocols cleanly, so you can use your OS/2 Warp workstation to access Novell's IPX, TCP/IP, and Net-BIOS stations. The process is so transparent that you actually see the network resources when the connection is made.

What's coming?

A long time ago, IBM's Jim Cannavino promised that IBM's OS/2 would deliver a "better DOS than DOS and a better Windows than Windows." It's beginning to look as if IBM has kept this promise. The difference being that everyone expected IBM to take on the version of Windows they knew at the time. No one realized that IBM was really setting its sights on Windows NT.

As it turns out, OS/2 Warp 3.0 has become a credible competitor to Windows NT and in many ways has sur-

passed it. While it's always had a great deal going for it, OS/2 had those embarrassing glitches that seemed to crop up at the worst time—for instance, during the middle of a review by a major magazine. Now, the glitches appear to be gone.

It's still too early to tell for sure what's coming. While we've seen an OS/2 Warp Server beta, it wasn't a final copy by any means. Eventually the released version of the software will appear, and we'll take a look and report on it. In the meantime, though, one thing is clear. IBM has moved into mainstream networking with a set of solid products, and finally users can be assured that they'll be able to use OS/2 for their networking needs, regardless of whatever it is they're doing now.

Wayne Rash, Jr. is a contributing editor to OS/2 Magazine and columnist for Communications Week. He's based in Washington D.C. and edits technology sections for The Washington Post. He can be reached at rash@access.digex.net or CompuServe 72205,221.

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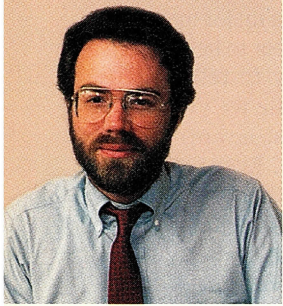
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Examining OS/2's Multitasking Structure

BY MARK MINASI

Since OS/2's introduction in December 1987, the strength of its multitasking has separated OS/2 from most other PC operating systems. To this day, its multitasking engine remains more powerful than the one found in the state-of-the-art version of Microsoft Windows—Windows 95.

People use many different definitions for multitasking. True multitasking, as I define it, is a system that can accomplish two things. First, it appears to run multiple programs simultaneously. Second, it multitasks, even over objections by the programs running.

Two at a time

The first part of my definition is necessary because people who know a bit about computers are often troubled when told that a computer with one processor can perform more than one task. To anyone with common sense, this seems impossible. Most CPUs can only do one thing at a time (Pentium-class processors are an exception, as they can do two or more things at a time), so suggesting that a 486-based system is truly printing that document while it finds a file and lets you edit your Ami Pro document, is at first glance, inconceivable.

Yes, it's true, that at any given nanosecond the CPU's Arithmetic Logic Unit is only adding together numbers from one set of locations, and the instruction pointer only points to one location—but we aren't really aware of nanoseconds. The smallest unit of time that we can perceive is about one millisecond. This means that for all intents and purposes, a CPU whose clock ticks one hundred million times per second might actually appear

to be many CPUs, whose "perceptual" clocks tick only about a thousand times per second. On the other hand, if you were to design a computer with multiple physical CPUs, it might seem that it's truer multitasking than you'd be able to achieve with just one CPU.

Oddly enough, this scenario is not really plausible. Most versions of OS/2 couldn't use an extra processor even if you had one to give (see "Imperfect Symmetry," October 1995, p.36). This is more a description of multiprocessing as an operating system that can manage and exploit multiple physical processors on a single computer. The versions of OS/2 that have an symmetric multiprocessing (SMP) kernel can exploit multiprocessor processor machines—but most can't. That's really not much of a problem, as there currently aren't many multiprocessor machines out there except in the server market.

Stage manager

Multitasking operating systems must multitask whether the applications like it or not.

One of the easiest ways to accomplish multitasking is to build a multitasking kernel that doesn't do all that much, leaving most of the multitasking to the applications. You can see this in some popular operating systems including Novell NetWare 3.11, the Macintosh operating system, and Windows 3.x.

The basic idea is that the kernel acts as a kind of stage manager in a vaudeville show: think of the word processor as the crooner, the spreadsheet as the person who plays the spoons, and the electronic mail program as the person who spins plates while singing. (Vivid imagery, eh?) You click the button for

your word processor to start printing; the crooner goes out on stage.

Now, an act such as the crooner is okay, but only for so long. You want your word processor to slap the clock up on the screen and lock everything else up for a few seconds, but after that it had better let you go back to what you were doing. You click the e-mail program, signaling to the stage manager (the kernel) that it's time for another act. The stage manager says to the crooner, who's still out on stage, "Pssst! Time to get off!"

Now, here's where the problems arise. In vaudeville, sometimes a performer would get out on stage and wouldn't leave when the stage manager motioned him off. For that reason, they had the hook. With the hook, a stage manager could physically yank a performer off the stage.

The problem with the Macintosh, Windows 3.x, and NetWare 3.11 is that they have no hook. Each of these operating systems relies upon the well-behaved nature of their applications. Suppose you have a word processor vying for time with a spreadsheet. Perhaps the word processor is printing and the spreadsheet is performing some complex procedure—both time-consuming tasks. How do you make sure that each one only takes a portion of the CPU's time?

One approach is called cooperative multitasking. When the designers of the word processor wrote the printing section, they should have said, "Hmmm...printing can take a long time. We'd better write this program to print for a short time, then go back and check with the kernel to see if it can keep doing this other function." The above defines a well-designed cooperative printing pro-

Under the Hood

gram. In contrast, a badly designed printing program would just print and print and print until it was done and then yield control back to the kernel.

In a case with a well-behaved spreadsheet and word processor, the word processor would print for a few milliseconds, hand control back to the kernel, saying, "I need control back when you can give it to me." The kernel would then give control to the spreadsheet. The spreadsheet would calculate for a few milliseconds and hand control back to the kernel, while asking the kernel to return control to it as soon as possible. The kernel would then hand control back to the word processor, and so on.

In this scenario, multitasking works quite smoothly. To the user, the spreadsheet and the word processor seem to multitask well. But who's in charge here—who's really making sure that the multitasking goes well? It's not the kernel, it's the applications. Once the word processor gets control, it loses control only when it chooses to surrender it. The applications are in charge, not the kernel.

The alternative form of multitasking is preemptive multitasking—the kernel possesses the hook. If an application has been on stage too long, the kernel just yanks it off stage. OS/2, Windows NT, and UNIX do this kind of multitasking. The beauty of this is that you don't have to write a bunch of polite applications—just one stern kernel. For example, if DeScribe is taking too long to print and Mesa is waiting to calculate, then the OS/2 kernel just freezes DeScribe for a few clock ticks, and gives Mesa a few clock ticks, then returns to DeScribe, and so on. A very neat approach.

But if it's such a neat approach, how come everyone doesn't use it? Apple, Microsoft, and Novell guys aren't dumb, so why did they use the cooperative approach?

Because when it works, the cooperative approach works great. In a pre-emptive kernel, the kernel program must periodically (dozens or hundreds of times per second) stop everything and grab control of the computer to re-assess the situation. Has this program been working too long? Is another program of higher priority? Should it receive higher priority? Should the kernel wrest control of the computer from one pro-

gram and give it to another? Even if all the kernel does is stop the music dozens of times per second and look around, that in itself takes up CPU time and makes the system less effective. In short, more CPU power is lost to overhead.

The Macintosh used cooperative multitasking because the early Macintosh applications were basically all written by Apple, so they could ensure that the original Macintosh applications followed the rules. In the Novell world, there wasn't a problem with badly behaved applications, because most NetWare servers that ran were the print and file server routines, and both programs were written by the same Novell programmers that wrote the operating system. That's why the Macintosh provided such a nice multitasking platform on a relatively low-powered computer. It's also how Novell was able to beat the pants off the competition.

In the case of the Windows applications market, however, no one was really in charge in the beginning, and even the people who should have known how to write a good Windows application—the Microsoft programmers—didn't. As a result, early Windows applications were real attention-hogs. Windows 95 does take some steps toward pre-emptive multitasking, but not quite enough. As people started using NetWare servers for client/server applications, they started putting non-Novell applications on their Netware 3.11 servers, and the servers stopped working. Novell's answer: NetWare 4.x supports pre-emptive multitasking.

OS/2 has always supported pre-emptive multitasking. Has that been a boon for OS/2? Yes, I'd say so. While OS/2 hasn't been a socko-smash as a workstation operating system, it's always had a strong place as a platform for client server computing. It seems to me that application servers must do pre-emptive multitasking.

Mark Minasi has been a consultant and educator in the fields of advanced PC operating platforms and PC technology since 1984. He is a contributing editor for Compute, BYTE, and OS/2 Magazine. You can contact him at CompuServe 71571,264 or via the Internet at mark@smtphost.mmco.com.

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Data at Ease

DataEase 5.0 for OS/2. BY BOB ANGELL

If you're familiar with relational databases, you've probably noticed that the world is divided into roughly two types: so-called "xbase" databases, which use variations on the dBase language (such as Paradox and dBase itself), and Structured Query Language (SQL) based databases like DB2 or Oracle. DataEase 5.0's ease of use, form definition, and overall database environment makes it feel like an xbase product. On the other hand, its file structure and query language make it appear to be an SQL database.

Regardless of the database type, DataEase, like most database packages, allows you to interactively manipulate or automate data analysis through application development (customized database front and back end). DataEase's application development environment is fully integrated into the product and not an add-on package.

Up and running

DataEase 5.0 runs under both DOS and OS/2, and the documentation is the same for both. Overall, it's easy to use and understand.

It's interesting that the OS/2-based installation process does not create a program icon on the desktop. To place an icon on the desktop, there are two options: peel off a Program template from the Template folder and fill in the information required or execute the **add program** icon in the Setup folder. Either way, it's less than ideal.

The first thing a user encounters when using DataEase is the logon screen. At this point, you can select an existing database or create a new one. (Drawing upon past experience, I'd rec-

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ommend that you create a separate subdirectory for each newly created database, thereby isolating the data files and making them easier to back up.) Once you type in the database name and appropriate user ID and password, you can begin using a database.

Building a database

To begin building a database, you must first create a form or series of forms. A form can be either tabular (one record per line) or free form (only one record shown on the screen at one time). Forms can also share information between them, thereby allowing one to create some very powerful programs. For those familiar with other database packages, a form is equivalent to a table of information.

DataEase supports multiple form creation (a main form and many sub-forms). Multiple forms can be created so that they appear to be one form on the screen. This multiform function-

ality makes it easy to add data to a displayed forms. DataEase also allows you to have regular, calculated choices (yes/no) and unique (which make one record unique from another) required, and Prevent Data-entry data fields. These data types are all called something different, but the functionality is generally the same.

All databases allow users to enter data in one way or another. I discovered two handy features to be invaluable and sometimes hard to duplicate in other packages. One feature allows you to create a field that can be incremented automatically when a record is created (this is helpful when creating a unique field for linking between forms). The other feature is the user-friendly pull-down menus for the application developer and end-user alike.

Querying the database

DataEase offers two mechanisms for querying a database: Query By Example (QBE) and DataEase Query Language (DQL). QBE simply uses the form or view that you have created as a template for querying the database and generating a report. This method can be used for most of your reporting needs and provides record grouping, sorting, statistical calculations, and columnar summaries, to name a few. The functionality built into QBE handles about 70% of all reporting needs.

If you need to do something advanced or complex, a QBE report can be converted to a DQL-based procedure and appropriately manipulated. Therefore, all of your efforts learning QBE is a nice springboard for learning DQL. DataEase also provides an SQL client connection package called SQL Connect for data extraction, manip-

New and Improved

Do you use DataEase 4.x? If so, here are the primary improvements in the new version:

- The ability to create multiple views over all tables in the database and to filter this data.
- The ability to create a form from existing Paradox 3.5 or dBase IV tables (files). The current versions of each of these packages cannot convert data backwards to the formats supported here.
- Compound and fast text indexing, which gives greater control and flexibility over data access.
- The OS/2 and DOS versions now have compatibility with DataEase for Windows, and a database can be used concurrently by all three products.
- The Graph-in-the-Box graphical package, formerly an add-on product, is now included.
- The nonextended memory DOS version is not available with this new version.

Most of the other new features are basically improvements on previous ways of working on the data. With these new features, DataEase becomes more closely aligned with an SQL database, especially in its ability to create multiple views and filters on the data.

lation, and reporting of SQL based data; it wasn't tested for this review.

DQL is DataEase's heart and Achilles heel. Using DQL, you can literally do just about anything with respect to creating, manipulating, and processing forms, views, and tables of data. DQL's embedded (noncompiled) and advanced processing lets you easily handle complex reporting, transaction processing, and application development. It includes mathematical, statistical, scientific, financial, and date and text manipulation functions to help transform your data. Also, DQL allows an application developer to have full control over the entire DataEase environment, thus encapsulating and protecting the database. DataEase or run-time mod-

ules are essential to an application as they cannot be compiled or operate as standalone executables.

DQL's syntax and operations are very similar to that of an xbase language, with a medium to high learning curve. Listing 1 contains an example of DQL code. This DQL code takes all information from **ORDER ENTRY** with the field "posted" = NO and then calculates and modifies the data in the **CUSTOMERS** and **INVENTORY** forms. Although DQL is more like an xbase language, the underlying structure and behavior is that of an SQL database. DQL acts on the data line-by-line, and it can be somewhat inefficient compared to SQL-based packages. SQL databases operate on the data by manipulating the entire table at once. When you collect large amounts of data, the performance of most xbase packages dwindles quickly. This is one of the many reasons that SQL is chosen over xbase database packages.

As good as DataEase is as a database package, it's still not a standard implementation of one of the main methodologies (xbase and SQL). Because of this, I suggest that you implement corporate databases in a language more standard and mainstream. If you use SQL or xbase, you can choose between a variety of database vendors and products without having to relearn a database language or, more importantly, translate and verify complex database applications into one of those languages if your needs change.

Notwithstanding the DQL weakness, DataEase is still suited for home and small-business use.

Data management

DataEase offers a variety of functions for database and system administration with built-in security for data access and transfer. It also provides a mechanism for backing up and restoring your data. DataEase makes an extra copy of the database in case of

power, equipment, or user failures when the database is backed up. In addition to the backup features, database status reports can be generated. These reports document the database structure, assigned filenames, form structure, system configuration, and other pertinent information. For someone assigned to maintain and fix database problems, these reports are invaluable.

System administrators can define configurations that your database may use, such as printers, specific users, and the way the screen will look. One weakness to this approach is that DataEase is not tied into the Workplace Shell, thereby not taking advantage of all the rich object information that OS/2 provides. DataEase also lets you import and export data between other programs, such as spreadsheets (for example, 1-2-3's .wk* files) or xbase database files (.dbf files created by dBase III/IV and compatible products).

Conclusion

DataEase 5.0 is a native OS/2 database environment that provides interactive database functionality and a strong application development environment—mainly because of DQL.

Listing 1: Sample DQL code.

```
for ORDER ENTRY
with posted = NO;
if customer # = blank then
enter a record in CUSTOMERS
copy all from ORDER ENTRY.
end

for LINE ITEMS
modify records in INVENTORY
qty on hand := qty on hand -
LINE ITEMS qty ordered.
end
end
```


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Performance seems comparable to other desktop products, such as DB2/2 and Paradox.

DataEase International should be commended for their first attempt and implementation of a Presentation Manager, text-based OS/2 application. This does not mean that there is no room for improvement. For future OS/2 releases of the product, it should be completely integrated into the Workplace Shell. This will eliminate the ugly character-mode interface and give DataEase more power by taking advantage of the object-oriented technology. Also, bear in mind that the advanced programming language DQL, isn't one of the industry standard languages—even though you can translate data from DataEase's formats into the .dbf format, you can use DQL programs and scripts with any other database product.

Bob Angell is a principal with Applie Information & Management System (AIMS) in Salt Lake City, Utah. His specialties include multiplatform data integration, database design and development, simulation and modeling of complex environments (neural networks, and OS/2 software integration. He can be contacted at bangell@cs.utah.edu.

Resources:

DataEase v. 5.0

DataEase International
7 Cambridge Dr.
Trumbull, CT 06611
(703) 374-8000
Fax: (703) 365-2397
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Peer Review

OS/2 Warp Connect vs. LANtastic. BY STEVEN J. VAUGHAN-NICHOLS

For years, OS/2 users have needed a peer-to-peer networking solution. Today, we have not one, but two solutions: IBM's OS/2 Warp Connect and Artisoft's LANtastic for OS/2.

Now, if it was a cut-and-dry case, where one product was much better than the other, you wouldn't have any trouble choosing between them. Unfortunately, the situation's not so simple. Each program does an outstanding job of enabling you to build peer-to-peer networks with OS/2. Let's take a closer look at both products and sort out the differences and similarities.

LANtastic for OS/2

At a list price of \$139 per node, Artisoft's LANtastic for OS/2 (or LAN/2 for short) is an inexpensive way to start networking. Despite its name, LANtastic for OS/2 is friendly for more than just LANtastic DOS, Windows, and Macintosh servers and clients. As network operating systems (NOSs) go, LANtastic requires little. You'll be able to run it on any OS/2 station with 8MB RAM and as little as 3MB disk space. LAN/2 will work happily with most common network interface cards (NICs), including an NIC with an OS/2 Network Drive Interface Specification (NDIS) driver.

LAN/2 works well with all NetBIOS-based LANs, such as LAN Server, Windows for Workgroups, Windows 95, and Windows NT. Best of all, regardless of the network, LAN/2 is speedy. You won't be sitting there drumming your fingers, waiting for data to trickle in from a server with LAN/2 at your beck and call.

As you might guess from that kind of top-of-the-line performance, LAN/2 exploits everything it can of OS/2's 32-

bit, pre-emptive multitasking environment. This is no Johnny-come-lately Windows application, quickly and sloppily transferred to OS/2—this is a full-fledged OS/2 application. OS/2 users will find LAN/2 a pleasure to use with its support for the HPFS, long filenames, and notebook-based controls.

Network administrators will also enjoy installing and managing LANtastic for OS/2. The program comes on a handful of floppy disks and takes less time to install than it does to cook dinner. Once in place, LAN/2 uses NetBIOS to talk to other LANtastic systems. LAN/2 can serve as both client and server to other LANtastic nodes running on MS-DOS, Windows, or Macintosh systems. LAN/2 also comes ready to use the Server Message Block (SMB) protocol over NetBEUI for complete interoperability with the Microsoft Windows networks and with IBM's own LAN server.

While LAN/2 uses SMB, it doesn't take full advantage of the protocol. In particular, LAN/2 can't recognize SMB host names. What this means in practice is that you must know an SMB server's name before you can access it. On a small LAN, this isn't a problem; but on a LAN in which SMB server connections are constantly being switched about, or simply on a very large LAN, administrators will find this shortcoming annoying.

LAN/2's one great foreign LAN support failure is that it doesn't support NetWare Core Protocol (NCP). This means that, to access NetWare 3.x or 4.x servers, you must add Novell's own NetWare requester for OS/2 to the protocol stack. Fortunately, LAN/2 gets along well with the requester, so you won't have any network catfights over who's in control of the connection.

Artisoft also sells a program that combines NetWare 4.1 with LANtastic functionality under the name, Dedicated LANtastic Server. This hybrid server can be accessed directly by LAN/2. Administrators who want the power of a NetWare server without the headaches might find this product an attractive option.

For an administrator, LAN/2 is both simple and powerful. You can set up drive and printer connections with a click of a mouse. Want to set up the printer queue just so? Head to the appropriate page in the Network Manager Notebook and go right to work.

LAN/2, along with the whole LANtastic product line, comes with excellent security. Administrators can set the system to allow users access only at certain days and times. Unlike many network operating systems, such as Windows 3.x for Workgroups, data can be protected all the way down to the individual file level. Unlike many security systems, however, LANtastic makes it easy to set individual and group security levels. While LANtastic doesn't quite give you the ability to fine-tune file security to the point that UNIX does, it does come close; and it can all be done with far less trouble.

Users will also find the product easy to operate. If they have permission, they can reassign drives by dragging and dropping icons. Power users will be able to make use of Dynamic Data Exchange (DDE) links between compatible applications to build complex, real-time data update applications between OS/2 and Windows systems.

With all that going for it, anyone would say that LANtastic is a winner. But the race isn't over yet.

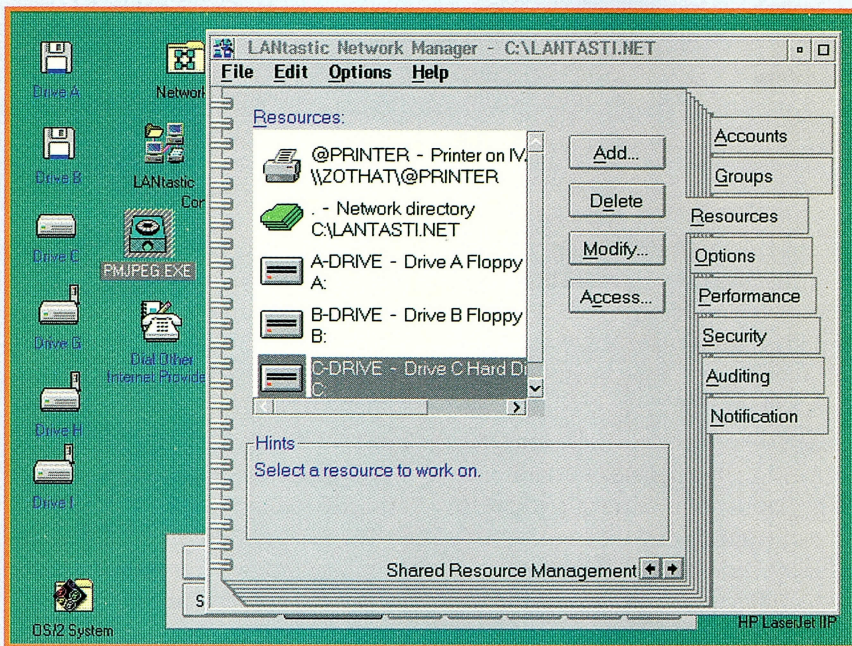


Figure 1: With LANtastic, almost any Warp user can manage a network.

OS/2 Warp Connect

At a base price of \$215 per node, IBM's OS/2 Warp Connect is more pricey than LAN/2, but some users will find it worth the additional dollars, especially for systems that don't yet have OS/2 Warp installed. OS/2 Warp Connect comes out of the box ready to build peer connections with other OS/2 Warp Connect systems, requiring a little more effort to work with NetWare, NetBIOS, and TCP/IP networks.

What OS/2 Warp Connect will take a lot of is memory and disk space. Plain old vanilla OS/2 Warp will run quite adequately with 5MB RAM on a 386, but don't even think about running OS/2 Warp Connect on anything less than a 486 with 8MB RAM and 90MB disk space. To be honest, you'd be better off with 16MB RAM.

Don't get carried away by the vast gulf between LAN/2's and OS/2 Warp Connect's hard-disk requirements. LAN/2 is simply an addition to an existing OS/2 system, while OS/2 Warp Connect is a complete replacement and upgrade of your operating system.

With that in mind, be ready to

spend at least half an hour at the CD-ROM based installation. While IBM tried to make the installation as transparent and slick as possible, you might still run into trouble getting OS/2 Warp Connect to work with some NICs. In addition, some cards, such as Artisoft's NetRunner series and some 3Com Etherlink sets, won't work with OS/2 Warp Connect without a third-party driver.

Still, once in place, you'll find that most of OS/2 Warp Connect's networking capacity fits the Workplace Shell like a glove. OS/2 Warp Connect isn't just an add-on to ordinary OS/2 Warp, rather, it's an advancement of the entire operating system. For example, OS/2 Warp Connect doesn't come with just the SLIP/PPP and application you need to hook up to the Internet. Instead, OS/2 Warp Connect comes with the full-fledged TCP/IP for OS/2 3.0 suite and stack. What you shouldn't do is to continue to use OS/2 Warp's SLIP or PPP tools or install them from the BonusPak. Instead, back up data files from your existing TCP/IP directories and let OS/2 Warp Connect install

the new TCP/IP straight from the main CD-ROM disk.

Harried network administrators will be pleased with OS/2 Warp Connect's ability to install itself across the network once you have one system up and running with it. This installation system must have at least 16MB RAM and more would be better. For most practical purposes, you can only use this method if all your systems are using the same-brand NIC. From this point, you must bootstrap the other systems into OS/2 Warp Connect with a Remote Install floppy disk and run the installation from the local machine, which uses the server's CD-ROM drive. The process usually goes much faster than installing from a CD-ROM drive.

For those of you who are unfortunate enough to be without a CD-ROM drive on your OS/2 machine, disk images are provided on the CD-ROM so you can install the network operating systems from 1.44MB floppies. However, I wouldn't do it that way unless my other choice was attending traffic court or the like.

Like LANtastic for OS/2, OS/2 Warp Connect works with NetBEUI, giving access to the Microsoft networking operating system family. Better still, OS/2 Warp Connect comes with a 3-bit NetWare and LAN Server requester, so whether your networking tastes run towards NetWare or LAN Server, you're ready to go. (Curiously—and annoyingly—the one important NOS that OS/2 Warp Connect won't work with is LANtastic!)

It does require a little home cooking, however, to get OS/2 Warp Connect to blend harmoniously with NetWare. The prime example of this is that OS/2 Warp Connect can't work with any existing NetWare login scripts. With the NetWare Tools utility, it's a big deal mapping the NetWare resources to your OS/2 desktop, but does require a little time and effort.

More troubling is that, while OS/2 Warp Connect lets you use NetWare

4.x's NetWare Directory Services (NDS), you have to dig around in your *net.cfg* file to activate this capacity. OS/2 Warp Connect also has the same problem that LAN/2 does with NetBEUI LANs: you must know a server's name before you can access it.

OS/2 Warp Connect does offer one feature that LAN/2 doesn't offer at all: remote connectivity. IBM pulls this off with the use of their LAN Distance Client Software. This software, although it can use TCP/IP, IPX, or NetBEUI across the phone lines, will only work with the LAN Distance Server; so, for now, you can forget about Novell and Shiva's offerings in this line.

Once you've got everything set up satisfactorily, you won't have to manually set up a maze of connections to different LANs with every power-on. OS/2 Warp Connect's Network Sign-on Coordinator lets you use a single user ID and password to bring up the entire network complex with one automatic login. Of course, as the sharp-eyed network administrators among you realize, this seriously lowers network security.

That's about the only place where IBM lowers its guard. For many users, the increase in usability might be worth it. Otherwise, OS/2 Warp Connect provides excellent security measures that are almost on par with those of LAN/2.

One place where OS/2 Warp Connect clearly doesn't keep up with LAN/2 is speed. Using identical machines, an IBM PS/1 with 16MB RAM, a 33MHz 486DX2 with NE-2000 NICs as a client and Windows for Workgroups 3.11, NetWare 3.12, and NetWare 4.1 servers, OS/2 Warp Connect always lagged roughly 20 to 30% behind LAN/2 in file throughput and remote program access. When working between systems running their own respective network operating systems, LAN/2 continued to hold a clear speed advantage of approximately 10 to 20%.

In terms of administrator throughput, the systems are about equal. Both make network administration a simple matter of opening the right notebooks and flicking the right check boxes. In terms of user-friendliness, both make it easy for users to play mix-and-match with available resources. Both NOSs are also remarkably stable. I forced servers to go up and down, and clients too, and never experienced a problem that a bright user—never mind system administrator—couldn't fix in a matter of minutes.

Making choices

Well, there you have it. Still confused as to which would be best for you? I can't blame you a bit. Let's see if I can sort this out for you. If you will be working with NetWare servers, OS/2 Warp Connect is clearly the better choice. Yes, it can be troublesome; but it's not as troublesome as retrofitting Novell's NetWare stack to LAN/2. If speed and still more speed is what you want, you might wish to go to the extra trouble, because LAN/2 is by far the faster of the two. If you don't plan to work with NetWare servers at all, LAN/2 becomes even more attractive. Unless, that is, you're also planning to hook into a TCP/IP network or dial into the system remotely. There, OS/2 Warp Connect holds the advantage. On the other hand, LANtastic does make it easy to connect to Macintoshes if you're running a two-machine architecture office.

It's enough to make a user or grown administrator cry. Chances are it will be obvious that one or the other will be the best for you; but it's also possible that you'll be stuck in the middle. With both companies committed to improving their products, it becomes even more difficult to choose between them. If it's any consolation, I find myself right in the middle as well. I have NetWare, LANtastic, Windows for Workgroups, and a PPP connection to contend with in my office. For

myself, I've decided to go with LANtastic for OS/2 and to content myself with the OS/2 Warp BonusPak's PPP connectivity. In part, I've done this because I'm very familiar with LANtastic and I'm loathe to give up my LANtastic server to another NOS. Your throughput will vary.

What I'd really like is for IBM to make OS/2 Warp Connect compatible with LANtastic; but some days you can't have your stack and run it too.

If it really comes to a coin toss for you, and you don't already have a commitment to LANtastic, I'd go with OS/2 Warp Connect. We've almost certainly seen the last version of OS/2 that won't include OS/2 Warp Connect's networking functionality, so you might as well have a network in place that's ready for OS/2's next generation.

Steven J. Vaughan-Nichols is a freelance writer and contributing editor to AT&T Interchange Online Service. He can be reached at sjvn@access.digex.net or sjvn@ichange.com.

Resources:

LANtastic for OS/2 (\$139/node)

Artisoft Corp.
2202 N. Forbes Blvd.
Tucson, AZ 85745
(800) 233-5564, (520) 670-7100
Fax: (520) 670-7101

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OS/2 Warp Connect (\$215/node)

IBM Corp.
Armonk, NY
(800) 342-6672
(407) 994-5544
For fax-back info., call:
(800) 342-6672 (enter 99).

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IBM Dictionary of Computing on Disk

A reference that only Big Blue could have written. BY ALAN ZEICHICK

Like many professional writers, I have a proud collection of English-language dictionaries, thesauri, synonym finders, and even references on foreign words often used in English writing. I also collect technical dictionaries. One of my favorites has been IBM's *Dictionary of Computing*, eighth edition (1987). Not only is it comprehensive, but it's also the only dictionary that explains IBM-speak relics from the mainframe era. Where else are you going to find "abend," which stands for "abnormal end," defined as "termination of a task before its completion because of an error condition that cannot be resolved by recovery facilities while the task is executing"—that is, a crash?

When McGraw-Hill decided to publish an update to this dictionary (10th edition, 1996) in electronic form as the *IBM Dictionary of Computing on Disk v.1.0*, I just had to have it! I now have a wealth of genuinely useful technical information at my fingertips, as well as a few that just make me chuckle:

IBM Operating System/2 (OS/2): Pertaining to the IBM licensed program that can be used as the operating system for personal computers. The OS/2 licensed program can perform multiple tasks at the same time.

IBM service representative: An individual in IBM who performs maintenance services for IBM products or systems. See also IBM Program Support Representative.

You won't find those anyplace else! Some definitions, while not par-

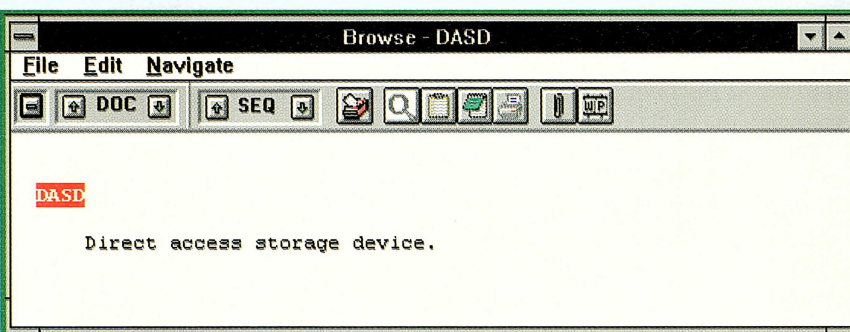


Figure 1: If you don't already know what something means, the dictionary's unlikely to shed much enlightenment. A DASD is actually a hard disk.

ticularly technical, will help non-IBMers work with Big Blue:

Authorized program analysis report (APAR): A report of a problem caused by a suspected defect in a current unaltered release of a program.

For non-IBMers, other definitions won't shed any enlightenment—see Figure 1. Most of the dictionary, however, is solid and useful:

Kernel: (1) The part of an operating system that per-

forms basic functions such as allocating hardware resources. See also nucleus. (2) A program that can run under different

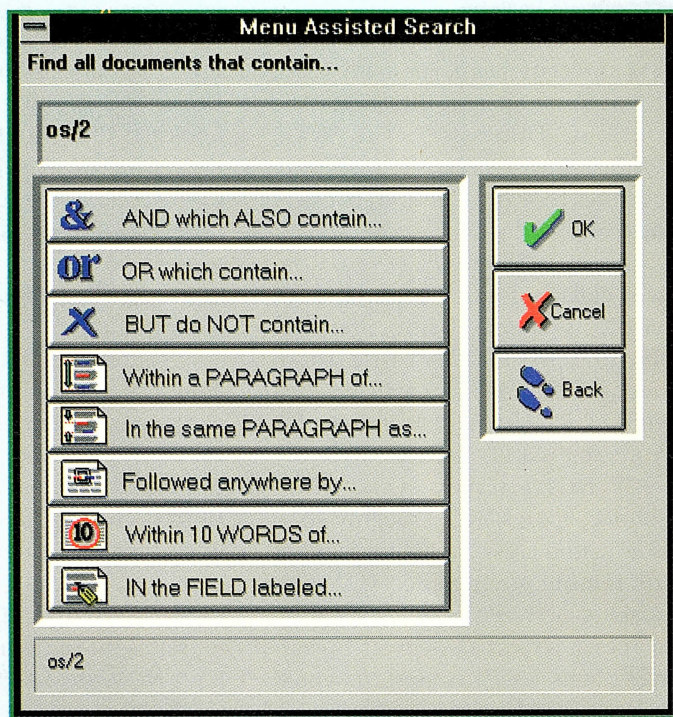


Figure 2: The dictionary's search engine is powerful yet unattractive. If you're setting up a complex search, you'll do a lot of pointing and clicking.

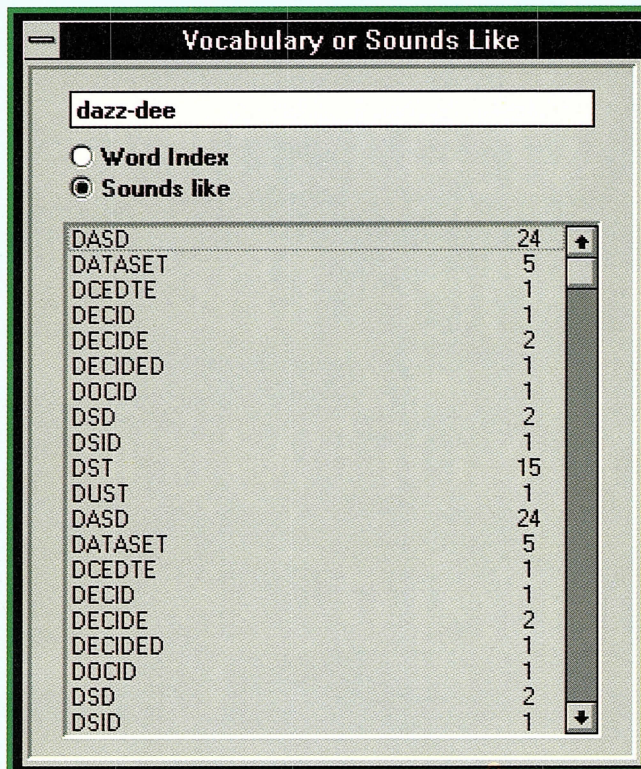


Figure 3: Give the dictionary a "sounds like," and it'll offer you several suggested technical terms—over and over again.

operating system environments. See also shell. (3) A part of a program that must be in main storage in order to load other parts of the program. See also bootstrap, initial program load (IPL), root segment. (4) See also security kernel. (5) The part of the AIX operating system for RISC System/6000 containing functions that are needed frequently.

The dictionary often seems a bit out of touch with today's non-IBM microcomputer world. You won't find Novell's NetWare listed, although you'll find IBM's NetView. Similarly, although there's coverage of the Micro Channel Architecture, don't bother trying to find the PCI bus:

PCI: Program controlled interruption.

Search software

Let's talk about the electronic software itself. The dictionary, which comes on four floppy disks, includes both DOS TSR (terminate and stay resident) and

2). It's a Visual Basic 3.0 application that uses menus and icons to help you limit your searches. From within a definition, you can double-click on any word to launch a search for that word in the dictionary, displayed in a separate window, so you can explore a topic and then work your way back up to continue your exploration. Similarly, you can view search hits by the name of the relevant definitions or in a much longer format that includes the context of those search terms (suitable for printing, but not really for on-screen viewing). Then, once you find what you're looking for, print the definition, or copy the text into the clipboard.

A nice extra: the dictionary can search by "sounds like," so you can type in "dazz-dee" and be shown that "DASD" is probably the word for which you're looking. (Annoyingly, the search engine does a poor job of removing duplicates from search

Windows 3.x search engines written by OverDrive Systems. The packaging says that the dictionary is OS/2 2.0 and OS/2 Warp compatible. I swiftly jettisoned the clunky text-mode DOS interface and decided to stick to the Windows version. (It's too bad IBM couldn't influence McGraw-Hill to add a native OS/2 search engine, but are any of us really surprised?)

The Windows search engine is powerful yet unattractive (Figure

results, so the "DASD" entry appears several times, as shown in Figure 3.)

On the down side, although the dictionary purports to include 200 graphics in addition to its 18,000-odd definitions, I've not been able to view them. Whenever I click on the little "camera" icon that's supposed to call up the image, I see the wonderful message, "Control array element '1' doesn't exist," the dictionary abends, ahem, *crashes*, and I can't use it again until OS/2 is restarted. (It's not an OS/2-related problem; I encountered the same error testing the dictionary on a Windows PC.) So, forget viewing the pictures, at least in v. 1.0.

The *IBM Dictionary of Computing on Disk* is a faithful rendition of the printed dictionary and powerfully augmented by its electronic search engine. It's not the only computer dictionary you'll ever need, however—it's far too IBM-centric for that! But it's a dictionary we all can use despite its lack of a native OS/2 search engine.

Alan Zeichick is Editor-in-Chief of OS/2 Magazine. He can be reached at CompuServe 76703,756 or via the

Resources:

IBM Dictionary of Computing, 10th Ed. (\$24.95)

ISBN No.: 0-07-031489-6

IBM Dictionary of Computing on Disk, v. 1.0 (\$34.95)

ISBN No.: 0-07-852800-3

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End Notes

End Notes, cont'd from p. 80

FileType program, the Galleria Lite image viewer, Eric Wolf's FileBar, a set of 200 icons, and two ATM fonts. Incidentally, apart from their intrinsic merits, these items also play a useful role in Brian's exposition. For example, FileType lets you create new object types that you can assign to files. The author uses this utility when explaining Associations in chapter 6.

My own favorite is the shareware FileBar, a space-saving menu bar that serves as a Launch Pad supplement. If you are using a pre-Launch Pad version of OS/2, FileBar is even more useful. It seems to work fine with my OS/2 2.1. FileBar provides another trick for reducing desktop clutter: the virtual screen. You can create up to nine virtual screens, each representing a group of open windows and each associated with a small numbered box. Clicking on a box opens up the corresponding set of windows. My \$50 registration fee is in the mail. Honest. Anything to remove that guilt-provoking warning each time I boot-up.

Summary

Although aimed at the computer novice tackling OS/2 Warp 3.0 for the first time, *The OS/2 Warp Survival Kit* contains many useful tips and insights for the more seasoned user. When you factor in the Bonus Disk, this book is a rare bargain at \$19.95.

Stan Kelly-Bootle started computing on EDSAC I at Cambridge over 40 years ago and has written more than 11 books. His "Devil's Advocate" column in UNIX Review has been running since 1984. His latest book is *The Computer Contradictionary* (1995, MIT Press). He welcomes e-mail via CompuServe 70323,1560 or Internet skb@crl.com, and Web visits at <http://www.crl.com/~skb>.

Resources:

The OS/2 Warp Survival Kit (\$19.95)

by Brian Proffitt

Addison-Wesley Publishing Co.

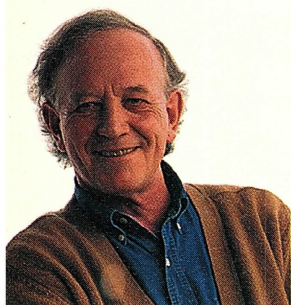
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The OS/2 Warp Survival Kit

BY STAN KELLY-BOOTLE

Regular OS/2 Magazine readers will need no fanfares to introduce the author of my book-of-the-month choice, *The OS/2 Warp Survival Kit*. The author, Brian Proffit, is a senior contributing editor for OS/2 Magazine and has been intimately involved with OS/2 since the Big Bang. (I mean the cosmic $t=0$, not August 24, 1995.) He was one of the OS/2 founding fathers at IBM, has served as the director of PC Week's Corporate Labs, and is now the president of Visionary Research. As the chauffeur for our "Test Drives" column, Brian confirms each month that he is uniquely qualified to help OS/2 users at the practical, productive level.

Lest you suspect some inter-columnar back-scratching in such flattery, I should explain that I select books for review from hundreds of OS/2 titles, with all the numbing objectivity I can muster. Contributors to OS/2 Magazine are, by definition, among the leading experts in the field, so it would be remiss of me to neglect their books simply to appear unbiased.

Brian's columns certainly confute the cynics who define *sinecure* as "the test-driving of native OS/2 applications." The same cynics might look at the title *The OS/2 Warp Survival Kit* and wonder if the book is addressed to IBM CEO Lou Gerstner and any of his cohorts who are pondering pulling the plug. Ironically, the book's foreword is the familiar, nay, mandatory, Workplace Shell panegyric by Lee Reisswig. Lee signs his piece as President, IBM Personal Systems, a position that he has not, alas, survived.

I rush to explain that Brian's survival kit is aimed not at IBM but at the

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user, and it correctly assumes that OS/2 Warp 3.0 is here to stay. The survival he is anxious to ensure is that of the first-time OS/2 user, freshly home from the computer store with the OS/2 Warp 3.0 box still shrink-wrapped. Unlike many experts, Brian knows how to patiently and without condescension impart his knowledge to beginners.

Chapter 1 takes you crisply through the installation process (both simple and advanced) with generous screenshots for each moment of decision. Once you are up and running, Brian rightly urges you to go through the online tutorial to learn the GUI basics, even if you are familiar with Windows. This approach certainly reduces the page count and saves a tree or two. Chapter 2 covers objects and the basic concepts behind the Workplace Shell. Again, Brian assumes that you've done the tutorial, and he concentrates on filling in the gaps.

The next three chapters explain

OS/2's rich array of customizing features: Setting Notebooks, the Scheme Palette, the Font Palette, the Icon Editor, and so on. Chapter 6 is a particularly rewarding account of Associations (linking file types with applications) and Shadows, two topics that perplex many beginners. The final chapter, "Getting Your Hands Dirty," covers the OS/2 System Editor, the archiving of system files, and some hints on solving booting problems. There's a useful glossary and an appendix on remapping the keyboard that lists the keystrokes to use if you lose your mouse. The emerging moral: Don't lose your mouse!

This is all nice, strictly nondummy stuff covering a remarkable amount of Warp-lore in just 164 pages and providing an excellent springboard for more advanced treatments, such as Brian's own *OS/2 Inside and Out*. But I've left the best news for last. What puts *The OS/2 Warp Survival Kit* ahead of the many rival introductory OS/2 books available is the free companion disk. Big deal, I hear you cry. Yes, I admit that was my initial reaction. Most computer books now come with disks or CD-ROMs, and so often they turn out to be ratbag collections assembled without much care or prior testing. This is especially true of the bonus CD-ROM where the urge to fill all 680 megabytes seems impossible to resist.

In contrast, Brian has selected a small number of high-quality freeware and shareware items with the beginner's needs in mind. A single command unzips and installs all the goodies in a new Survival Kit folder. You get Siegfried Hanish's fun-packed Screen-Saver, the *zip/unzip* utility, Brian's own

End Notes, cont'd on p. 79

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OS/2 Magazine

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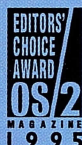
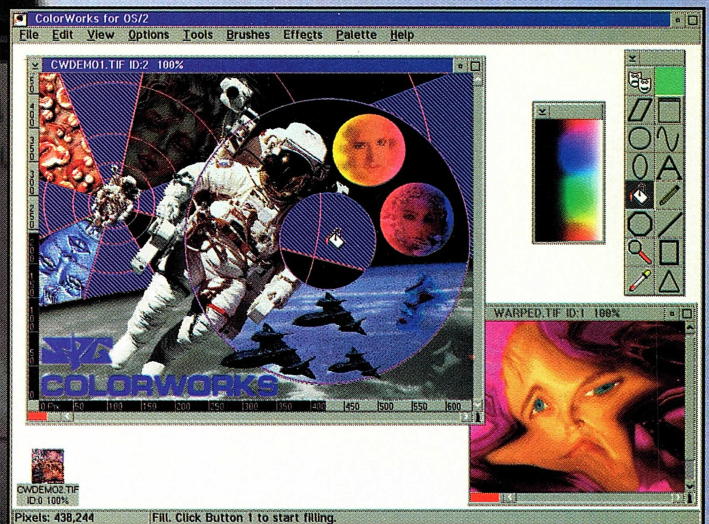
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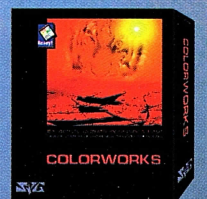


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